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ENGINEERING FINANCE COMMERCE

PROTECTION OF AMERICAN LIVES AND PROPERTIES IN CHINA

America is Committed by Every Concep-
tion of Honor and Good Faith to
Support Great Britain and Japan
in the Defense of Treaty
Rights in China.

BY GEORGE BRONSON REA.

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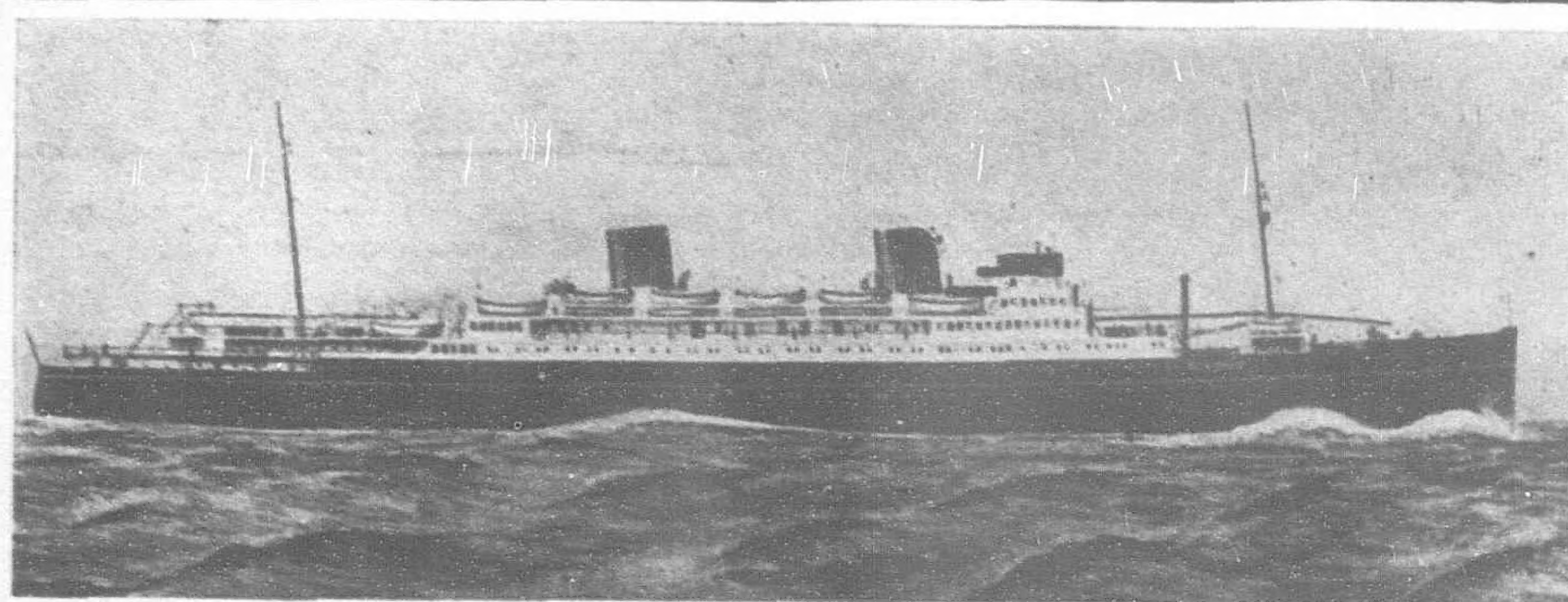
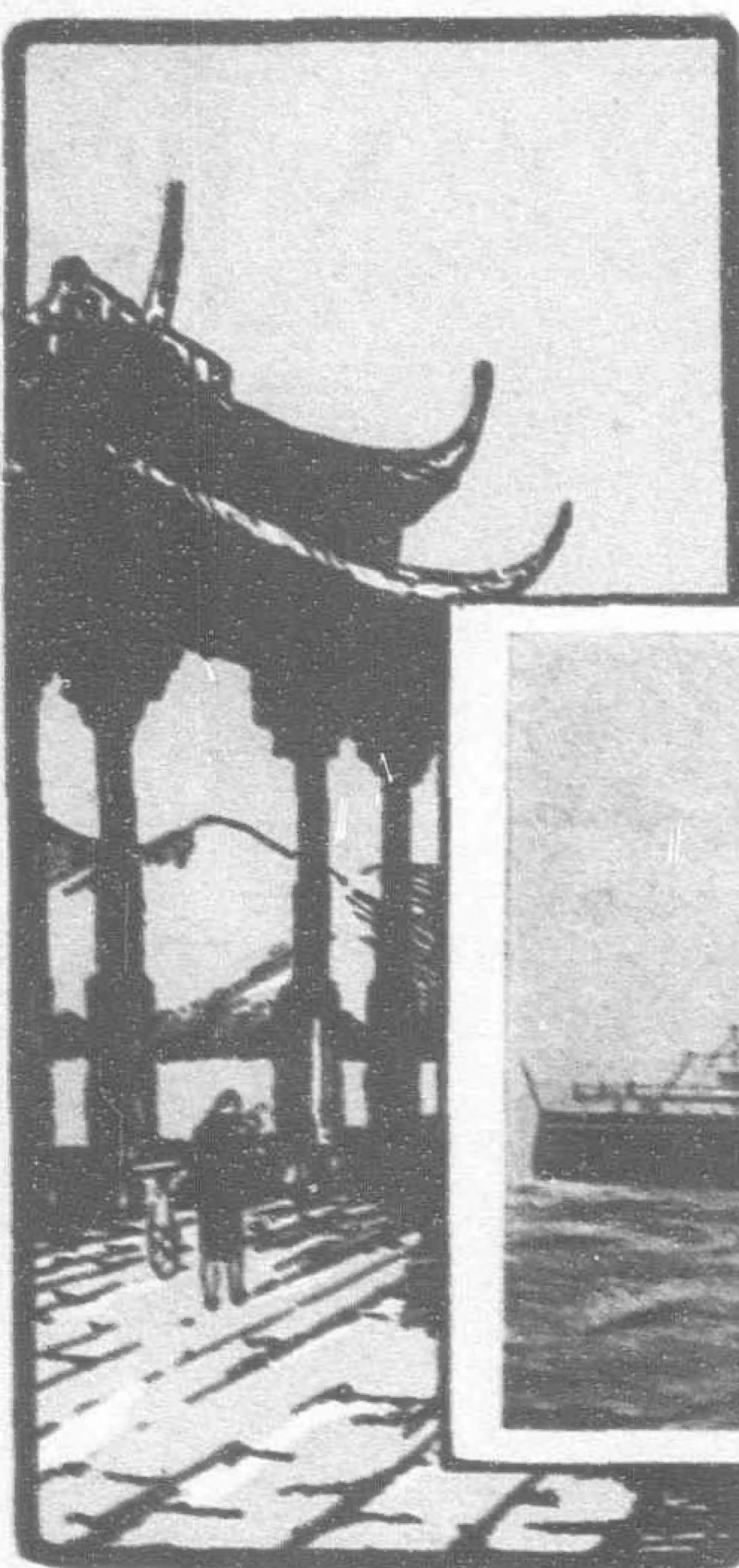
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Vol. XXIII July, 1927 No. 7

SHANGHAI, PEKING, TOKYO AND MANILA

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The Far Eastern Review

ENGINEERING

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VOL. XXIII

SHANGHAI, JULY, 1927

No. 7

Protection of American Lives and Properties in China

America is Committed by every Conception of Honor and Good Faith to Support Great Britain and Japan in the Defense of Treaty Rights in China

By George Bronson Rea

Mr. George Bronson Rea, editor and publisher of the "Far Eastern Review" appeared before the National Foreign Trade Council at its Convention at Detroit, Michigan, on May 27, 1927, as the representative of the American Chamber of Commerce of Shanghai. In the course of the convention, he delivered the following address, which has already received widespread publicity in the United States.

MR. PRESIDENT, MR. CHAIRMAN, LADIES AND GENTLEMEN: I come before you as the Delegate of the American Chamber of Commerce of China. I have lived in China for 25 years as the publisher and editor of THE FAR EASTERN REVIEW, the only American trade and industrial magazine in that part of the world. At one time I was intimately associated with Dr. Sun Yat-sen as adviser in charge of his railway program. I held his power of attorney to finance his new national railway scheme. I loved him and respected him and have loyally defended him on all occasions against the attacks of his enemies. I sympathize with his cause. I would like to see the Nationalists win out in their struggle to implant his ideals, but as long as they are allied with the Soviet; as long as I am certain that the Soviet is carrying on a fight against the so-called capitalist powers behind the screen of the Nationalist armies; as long as their object is to drive the foreign business men from China, despoil them of their properties, oust them from the treaty ports and make Shanghai the Far Eastern center of world Revolution, my first duty is to my fellow countrymen.

In painting the picture of conditions in the Far East, I do

not wish to be understood as condemning the policy of our Government. The point I wish to make and emphasize is that whenever a crisis arises in China calling for firm action on the part of our

Government for the defense of its basic trade rights, it is the Uplift element in this country who monopolizes the public platforms and floods Washington with resolutions recommending acceptance of the Chinese view-point. They are always articulate; always on the job. The business men of this country are not articulate. If Americans in China are now being adequately protected by our armed forces, it is because the President has declined to be guided by the recommendations of the Uplift element urging him to withdraw all American warships and troops and surrender immediately to the demands of the nationalists. The President has done all he could under the circumstances. He has to be guided largely by public sentiment. Public opinion in this country demands that we play a lone hand. We hesitate to co-operate with the other powers for the protection of foreign lives and properties. We believe we can win out alone and retain the friendship of the Chinese. We may, but if we do we will lose the friendship of others.



Mr. George Bronson Rea

In every instance where the subject of China has been discussed from a public forum in this country for the past six months, the speaker has been either a missionary, an educator, a Y.M.C.A., secretary, or a propagandist in the pay of the Nationalist Government. Not once do the newspapers record an instance where a banker, a merchant or a Chamber of Commerce has spoken in defense of their trading rights. Only two American firms have approached the State Department asking for protection.

Perhaps the reason why American firms interested in China have refrained from asking the State Department for protection, is because they have been intimidated by Nationalist agents.

I have seen one of their confidential statements describing the birth and development of the Nationalist movement which frankly admits the alliance with the Soviet and winds up with the following threat:

"Persons and organizations in China to-day suspected by the people of blocking the free development of the Nationalist movement will have their usefulness seriously affected and even their continued existence threatened. The same would be true of Governments and nations."

Mind you, this is not a public statement that might be reprinted in the newspapers. It is a secret and confidential warning to an American firm doing business in China. From this one instance you will readily understand how difficult it has been for any American firm holding property in China to openly approach his own Government for the protection he is legally entitled to. The resolution of the American Chamber of Commerce of China calling upon our Government for international armed intervention for the preservation of foreign lives and properties is the only instance where our business men have gone on record in defense of their own interests.

Perhaps the American Chamber of Commerce of China worded its resolution too strongly, but there were good reasons for it. If it came out fairly and squarely for armed international intervention, it is because it had reached the limit of human endurance and felt compelled to make some effort to counteract the campaign of scuttle advocated in this country by sentimentalists and Chinese propagandists.

To speak plainly, the fundamental American Open Door doctrine for the protection and advancement of our trade interests in China has become subordinated to our national Uplift activities. American investments in China are now revealed as totalling \$150,000,000, of which \$80,000,000 represents missionary and uplift properties. Of the balance, \$40,000,000 represents loans and frozen credits to the Chinese Government. This leaves \$30,000,000 as our commercial stake in the country.

Our exports to China over a period of three years averages \$100,000,000 a year. If we assume a fair five per cent. profit on this, the increase to the national economy is about \$5,000,000. On the other hand, the missionary boards spend \$10,000,000 a year in missions alone. Add to this the expenditures for the maintenance of colleges, hospitals, Y.M.C.A.'s, the Rockefeller Institute and other benevolent institutions and the total will approximate \$15,000,000. The balance sheet shows that for every dollar of profit we take out in trade, we hand back to China two dollars for charity. The distribution of this charity requires two uplifters for every American engaged in trade. They outnumber and outvote us two to one.

The Uplift movement in this country has become one of our most highly organized and efficiently directed activities, deriving its support from the contributions of the church-going public and endowments from business men. Like a snow ball rolling down hill it grows with its own momentum. Each year calls for an increasing expenditure. Naturally, anything that might diminish the flow of these contributions, strikes at the very life of the movement and the usefulness of its agents. In any crisis where our Government is called upon to support its basic trade doctrine in China by force or firm diplomacy, the interests of our traders are invariably subordinated to sentiment by the pressure exerted upon the administration by missionary boards and Uplift bodies. Any action on the part of our Government that might create an anti-Chinese sentiment in the United States and cut off the contributions for Uplift work in China, is vigorously opposed. Any move that might create an anti-American sentiment in China that would undermine the position and usefulness of the Uplifters, is equally inimical to their interests. The influence of this element is so powerful that no President, Secretary of State, or politician can afford to ignore it, and although I would not care to say that the

pressure is openly applied, the sub-conscious reaction on the officials in Washington is one of deference.

It is only necessary to read Mr. Henry Morgenthau's book, "All in a Lifetime" and "Colonel House's Memoirs," to realize that our missionary and educational interests dictate the selection and appointment of the American minister to China. The present incumbent is the exception to the rule.

Now the only legal right Americans have in China, is the right to trade. To this basic privilege we have added the right to propagate our ideals, our religion and our culture through the medium of missions, schools and colleges under the treaties originally designed to protect our trade. If our major interest in China is to expend millions of dollars yearly in propagating our ideals, then we cannot deny the same right to the bolsheviks for using the same means to achieve similar ends. The underlying principle is the same in both cases. If these propaganda rights have received the sanction of the Chinese Government, they are merely secondary rights, to be surrendered when China's full sovereignty over her educational and religious institutions is recognized by a revision of the treaties. Our trade comes first and in any controversy with the Chinese over treaty rights, the Uplift element should take a back seat and let our commercial interests have their say. It is the American business men who are doing the Nation's constructive work in China and it is to the business men that the missionaries, educators and Uplifters must look for their endowments. If it comes to an issue as to who shall withdraw from China we cannot ask our traders who are building up the foreign trade of the nation to get out in order that our charities may have a free field. We cannot mix trade with sentiment. The sooner the American people realize this the better it will be for their future prosperity.

American traders in China have every right to expect that in any issue where their lives are imperilled, our Government will come to their protection and enforce respect for the treaties. They sympathize with the aims and aspirations of the Nationalist party and are willing to surrender their extraterritorial privileges just as soon as a unified Government is evolved out of the present chaos and can guarantee them protection and some measure of justice and security.

American business men in China have been encouraged to go there by their own Government. For several years, the Department of Commerce conducted a campaign to induce American manufacturers to open offices in China. Congress passed a law known as the China Trade Act, exempting from federal taxation American corporations operating in China. On the surface, the China Trade Act was designed for the purpose of placing American firms in China on the same footing as the British, but the real object was to facilitate the co-operation of American and Chinese capital in creating new joint enterprises in that country. For many years, British registered companies in China had been exempt from income and other taxation and as a result Chinese capital flowed into their enterprises. Americans were handicapped in this competition for Chinese capital in establishing new factories and industrial plants, so they started the campaign which finally resulted in the passage of the China Trade Act, which, amongst other things, exempted them from taxation and placed them on an equal basis with the British. You will recall that there was great rejoicing in this country when that bill was enacted into law. The whole country approved of it. The Chinese Government cordially endorsed this program, and conducted a propaganda campaign of its own to bring Americans into China. As a result, many American firms answered the call and established themselves in Shanghai and other treaty ports. Our Government followed them and appointed officials from every department except the interior to supervise their activities.

It is true, perhaps, that the United States has no concessions in China but our citizens reside and conduct business in the concessions held by other powers and enjoy all their privileges. If the other powers should decide to preserve their concessions for the exclusive use of their nationals, where, pray, would the Americans reside? Do you know the story of Shanghai? When the Chinese Government handed over the mud flats outside the old native city to France and Britain, it set aside what is known as the Hongkew district as an American concession. Our Government, however, declined to accept it and in time incorporated Hongkew in what is now the International Settlement, in which we hold equal rights with all the other Powers, except the French. On our own initiative we internationalized the concession that China willingly presented us with and so become equally responsible

with the other Powers for its protection. After all these years of participating in the municipal government of Shanghai, how can we now stand aside and refuse to co-operate with the other Powers in defending the International Settlement? How can we defend American lives and properties in Shanghai without fighting shoulder to shoulder with the British, the Japanese, the Italians and others? Americans in Shanghai have their offices in the International Settlement, but the majority reside in the French Concession. The American school and community church are located in the French Concession. Over \$30,000,000 worth of property is registered in the American consulate at Shanghai. American trade in Central China and the upper Yangtze region has been built up by American firms whose headquarters are located in the British concession at Hankow. How can our Government protect the properties of its citizens in this port without co-operating fully with the British? How can we protect our homes, our school and our church in the French concession of Shanghai without co-operating with the French? Is it playing the game to denounce the other fellow and refuse to co-operate with him when the Chinese, urged by the Soviet, turn on all foreigners and by force of arms demand immediate return of the concessions? The American business man in China recognizes his debt to the British, to the French, to the Japanese, and other nations whose hospitality and police protection he has been forced to seek because his own Government after inviting him to come to China, has consistently refused to accept a treaty port concession that the Chinese Government in the past was always willing to set apart for him. American business men in China have been compelled to live within those foreign concessions controlled by other powers. The American missionary on the other hand has enjoyed special residential and property privileges outside the treaty ports not available to his commercial brother. It makes little difference to the Uplifter if the foreign treaty port concessions are surrendered to the Chinese. His work goes on under the same old conditions. He can afford to lead the campaign in this country for the immediate recognition of China's sovereign rights. He loses nothing by the change. The trader pays the price of the Uplifters' altruism. Is it any wonder that the American Chamber of Commerce of China faced with a possible looting of Shanghai and a repetition of the horrors of Hankow, Nanking and Kiukiang, pleaded with their countrymen at home to support them fully by armed international intervention? To have done otherwise, would have stamped them as weaklings, as hypocrites and as ingrates. Had they deserted the British by following the lead of the Uplift element in demanding the immediate withdrawal of American warships and marines, never again could they have held up their heads in China. Had our Government in Washington acted on the advice of those who clamored for the immediate withdrawal of our armed forces in China, the lives of every American in Nanking would have been sacrificed. Americans in Shanghai thank God that the British troops arrived there before the Nationalist army; they are proud they had an Admiral of the Yangtze patrol who lived up to the highest traditions of the American Navy and had the courage to cut red tape and come to the rescue of his imperilled countrymen.

Americans in China have not forgotten that in every instance for the past two decades where the affairs of China have claimed the attention of their Government, we have insisted with the full force of our diplomacy and finance on complete international unity of action. Only once during the Wilson administration did we depart from this principle and then had to return to it when it was found that unless we did co-operate with the other Powers, American capital could not participate in the development of China. In fact, it has been a settled policy of the American Government to do nothing in China unless it could rely on full international co-operation. We followed this doctrine in our railway negotiations and turned over to an international banking group the currency loan that the Chinese hoped we would finance alone. The whole consortium principle from the American banker's standpoint, is based on the fact that it is impossible to sell a Chinese bond to the American investor on the support of the State Department alone. Only the guarantee that lies behind the support of the four great Powers can make a Chinese bond salable on the American market.

We insisted on international co-operation in financing China, and, in doing so, broke down the barriers which kept Russia out of China. We forced the Japanese to surrender to the consortium the Taonan-Jehol concession, which they were holding as the one defense of China and Japan against "the menace from the direction

of Urga." As self appointed trustee for the Russian people, our Government pressed Japan to evacuate her armies from Siberia and Northern Manchuria thus opening the door for the Bolsheviks to recover their lost positions in those regions. Supported by the British Dominions, we broke down the Anglo-Japanese alliance at the Washington Conference when we labored under the hallucination that we were in danger of going to war with Japan. This alliance stood for twenty years as the one guarantee of peace in Eastern Asia; the one check to Russia's designs on China. We deliberately ignored the part that China had played through her secret alliance with Russia in 1896 which forced Japan and Great Britain to come together in defence of their menaced interests. Even after China's tardy confession at the Washington conference when a telegraphic summary of the secret Sino-Russian alliance was read before the delegates by Dr. Wellington Koo, not one American writer on Far Eastern affairs, not one public speaker, had the courage to accept the evidence that gives an entirely new angle to Far Eastern history and fully justified Great Britain and Japan in maintaining their alliance. We closed our eyes to the facts and superseded an alliance with teeth in it for a Four Power Pact safeguarding our insular possessions in the Pacific. We purchased peace in the Pacific at the expense of Great Britain and Japan in Asia and as a direct result, the Russians again swarmed into Mongolia and Manchuria and now dominate the Canton Government, carrying on their war against Great Britain behind the screen of the Kuomintang armies.

When we induced the other powers to join the consortium in 1921, Mr. Lamont proudly announced that the new line-up was in effect, a Far Eastern League of Nations. Mr. Lamont was right. The present consortium for financing China was created on our own initiative. It was the American Secretary of State who issued the invitations to Great Britain, France and Japan to join us in this undertaking and in order to make the plan acceptable, we even offered to finance the French and British groups until such time as they could take over their share of the loans. Although the consortium has not functioned, that agreement is still in force. In plain words, in order to obtain the co-operation of Great Britain and France to forward our own policies in China, we were willing to carry the full load of financing them. We are committed to play the game with them, but the other members of this Far Eastern League of Nations now learn that when our co-operation becomes essential to uphold or defend their interests placed in jeopardy as a result of their acceptance of our ideas, we decide to play a lone hand. As many American newspapers put it, "America will not rake the chestnuts out of the fire in China for Europe." These Americans, however, overlook that we did not scruple to use Great Britain to rake our chestnuts out of the fire when it looked as though we might have to fight Japan. Great Britain gave up her alliance with Japan to please us and as a result now finds herself up against it in China with the Soviet determined to destroy her investments and her commerce and drive her out of Asia. There may be excellent reasons why America should pursue a lone hand in China at this time, but there are equally good reasons why we should stand shoulder to shoulder with Great Britain and Japan. Whether we like to admit it or not, we are committed by every conception of honor, of loyalty, of good faith and common decency to co-operate fully with these nations for the preservation of foreign lives and properties in China. China is entitled to a square deal. Every American is with Canton in its present struggle, but our friendship for the Chinese should not blind us to our obligations to the others. If the British and Japanese are driven from China, we will follow.

The British stake in China exclusive of Hongkong, is \$1,750,000,000. British and French capital has, in the main, built the railways and developed the mines and industries throughout China Proper, which, in turn, has made possible the trade expansion Americans are now participating in. Outside of our \$7,500,000 share in the Hukwang loan, America has not contributed one dollar towards the construction of China's railways, and even in this loan we have not a mile of railway equipped with American materials to show for our investment.

The Japanese stake in China is estimated at two billion and a half dollars. In Manchuria alone, Japan has \$1,500,000,000 invested, half of it in a railway built to American standards and specifications. In this alone, Japan has done for us something we have never been able to do for ourselves in China. Since the South Manchuria Railway came into the possession of Japan as a

result of her war with Russia, the Japanese have purchased nearly \$100,000,000 in American materials for this line and its allied industrial enterprises. The exact figure stood at \$75,000,000 five years ago. Let me tell you what this means. In order to finance all the other loan-built railways in China, the European nations advance to the Chinese Government approximately \$150,000,000. Out of this sum, they received in exchange about 50 per cent. for materials required in the construction and equipment of the lines, or \$75,000,000. In other words, American manufacturers received from Japan without lending her one cent, orders for materials to the same extent as though we had financed all the Chinese Government railways. Even when the Japanese controlled the operation of the Shantung Railway during the war, out of a total of \$10,000,000 spent in new materials, some \$6,000,000 came to the United States. They transformed the old German line into a modern American railway.

Japan has gone into China, not to exploit the country, but to build up industries in a legitimate manner. Far from exploiting the Chinese, the shoe is on the other foot. The Japanese have been exploited. Outside of the South Manchuria Railway, not one of her enterprises in Manchuria have returned a fair rate of interest on the investment. The money in nearly every case has gone into the pockets of the Chinese. Japan owns outright forty per cent. of the total cotton spindles in China and through her loans to private Chinese cotton mills, now controls over fifty per cent. of China's cotton industry. She has Y. 45,000,000 invested in the shape of loans in the Han-Yeh-Ping Company, which operates the great Chinese steel mill at Hanyang, the iron mines at Tayeh and the coal mines at Pinghsiang, all located in the heart of the Hankow region. Japan has \$15,000,000 in the Kiangsi Railway, tied up for years, on which she has received neither interest nor principle. Japan has gone into China in the same way that Americans were invited to go there under the China trade Act, co-operating fully with the Chinese for the development of their country.

Look at the position of Japan. Here you have the picture of a country with a rapidly increasing population denied the right of emigration into the White Man's countries, fighting desperately and honorably to solve its problems in a peaceful manner. Japan's only hope of a peaceful solution lies in keeping her children at home and finding employment for them through industrialization. Even this is no solution unless markets are available for the sale of their manufactured products. Japan's eyes are turned towards China as the main source of her food supply and raw materials and as a market for her manufactured products. If China collapses, Japan faces ruin. Japan is now passing through a severe financial crisis, traceable in large part to the long drawn out civil warfare in China. Our loans and investments in Japan total about \$500,000,000. If Japan's investments in China are wiped out, how can she pay her debts to us? So aside altogether from the political and sentimental aspects of the China situation, the economic phase has a direct bearing on the ability of Great Britain and Japan to pay their debts to the United States.

American Exports to China total \$100,000,000. Do you realize that thirty to forty per cent. of these exports are sold through Japanese firms having offices in this country? Another ten to fifteen per cent. passes through British hands. Japan buys from us Y. 360,000,000 worth of cotton. The textile industry is the basis of her export trade. If her trade with China collapses, our cotton growers will lose a valuable market. If Japanese and British investments in China are ruined and American firms are forced to leave the country, our trade with China will drop at least fifty per cent. and our market in Japan will dwindle to an alarming extent.

Another financial crisis in England or Japan will shake the very foundation of world credit, dislocate world trade and compel America to finance these nations, in order to protect her own interests. Once more we will hold the bag. Every crisis of this nature is one more victory for Moscow, one more step forward towards the Soviet goal of world revolution.

This, gentlemen, is the real aim of the Soviet leaders allied with the Nationalist movement in China. On the surface, the Kuomintang party, inspired by the highest patriotic motives, are waging a worthy fight to implant their ideals of popular Government and overthrow the militarists, but their Soviet allies are openly fighting the so-called capitalist nations in a determined attempt to oust the foreigner and hold Shanghai as their Far Eastern center of world revolution. Soviet commercial agents come before you in this convention urging you to extend them trade credits, yet their

political agents in China are destroying the trade and investments you have built up in that country at so much labor. For every dollar we will gain by financing the Soviet from this end, we will lose three in China. For not only is our own trade affected, but the trade of England and Japan, our best customers.

LEST WE FORGET! Once before China and Russia entered into a secret alliance for the purpose of crushing Japan and giving Russia a warm water port on the Pacific from which her fleets, acting in conjunction with their French ally, could wrest from Britain her empire in India. This was the sole reason for the Anglo-Japanese alliance. The moves of Russia compelled Great Britain to demand compensatory concessions from China in order to protect herself. The scramble for concessions in 1898, the partition of China into spheres of influence came as a direct result of China's secret treaty with Russia. With this alliance in full force, the American Secretary of State, John Hay, in complete ignorance of its terms, promulgated his now famous Open Door Doctrine, which, amongst other things, guaranteed the integrity of China's territory at a time when she had surrendered her sovereignty in Manchuria to Russia. Japan, also maintained in ignorance of the terms of the secret alliance, gladly accepted the American doctrine, thus tying her own hands, while Russia and China were secretly preparing to crush out her national existence. That war was fought. Japan sacrificed 200,000 men and nearly bankrupted herself. China, the full ally of Russia, emerged from the struggle as the innocent and injured victim. Had the text of the secret alliance been known at Portsmouth, China would have been compelled to pay her full share of the indemnity, by ceding Manchuria to Japan. She escaped scot free. Not until the Washington conference, twenty-five years later, did China officially admit the existence of this secret pact, which brought upon the world one of the bloodiest wars of modern times. Ponder over it, gentlemen. For twenty-five years the world was maintained in complete ignorance of the most cynical and disastrous piece of secret diplomacy recorded in history.

Once more we see the outward working of a secret agreement between Russia and China. It is plain that such an agreement exists. What are the terms of this secret understanding? We know no more to-day than we did in 1898. The same conditions exist to-day as existed thirty years ago, with Moscow and Canton linked up in an understanding to oust Britain and Japan from their positions in Asia. As long as this understanding remains in force, as long as the Nationalist party in China is openly allied with Moscow, the rest of the world must expect that Great Britain and Japan will make every effort to defend their rights. Once before the American Government unwittingly and with the best of intentions, intervened in a situation which strengthened the hands of Russia. With the clear evidence before us of another secret pact between China and Russia, we are being urged by Chinese propagandists and American sentimentalists again to strengthen the hands of Russia by acceding to the Cantonese demands. It is true, perhaps, that our interests in China are not altogether identical with those of the other Powers, and if the issue was one solely identified with Chinese nationalist aims, there would be some justification in holding ourselves completely aloof from the other Powers. But the fight is clearly one between the Soviet and the so-called imperialist or capitalist nations, in which they are using the Chinese nationalist movement to conceal their real purpose. We cannot defend American lives and properties in China without sending our troops into the concessions held by the other Powers. Only through full and loyal co-operation with Great Britain, France and Japan can our Government carry out its program to protect American interests in China along the lines laid down by the President in his speech. That, gentlemen, is the reason why the American Chamber of Commerce of China sent out its appeal for armed international intervention and that is the reason why I, its representative, appeal to you to stand by your own agents and make your voices heard in Washington in opposition to the propaganda of those who are urging our Government to withhold its troops and warships and evacuate all Americans from China. We owe a debt to the other Powers. We cannot withdraw and leave them to fight our battles for us. We cannot desert those whose sacrifices for peace in 1921 brought security to us, and retain our self-respect.

One word more. The slogan of this convention is "GREATER NATIONAL PROSPERITY THROUGH GREATER FOREIGN TRADE." What will it profit you if you increase your trade in one part of the world and lose it in another? What will you gain by a few more exportations to Latin America or Soviet Russia,

if you lose out in China; if the purchasing power of Great Britain and Japan, your best customers, is curtailed? If this convention means anything at all, if your objects are to be realized, you must insist upon full co-operation with the other Powers in China for the protection of mutual interests. If they go under, in some way or other you will pay the bill. These Americans in China who are pleading for full co-operation with the other Powers are doing the work of the American manufacturers represented in this audience. They are your men, your agents, fighting your battles for foreign trade. Stand by them! When you leave this convention, sit down and write to the President and back him up in his policy. Remember that powerful influences are at work to persuade him to withdraw our warships and troops, surrender immediately under threats our treaty rights, and evacuate all Americans from China. Remember that concessions wrung from us under pressure, will cheapen American lives in China. The President has stood by our commercial interests in the face of the most powerful campaign to surrender our treaty rights and abandon our citizens to the tender mercies of a hastily improvised military Government, incapable as yet of preserving law and order and guaranteeing the lives and properties of its own people against the hordes of bandits who overrun the countryside looting, and burning homes and villages, ruthlessly killing old men, women and children and carrying off to their lairs

the younger women for the satisfaction of their bestial desires.

It is not for me to originate any resolution at this convention. If I could I would ask the foreign trade organizations represented here to draw up and pass a resolution expressing their appreciation of the President's firm stand in defense of American lives and properties in China. It was said that he would sacrifice his political future if he sent American warships and troops to China. He declined to be guided by this advice and ordered our warships and troops to the places where they were most needed. Public sentiment now applauds what he has done. The danger is not over. Other Powers are strengthening their forces in China in order to more adequately protect their nationals when dangers again threaten. Before the end of the chapter is reached, America will again be called upon to take the same stand. Are we to co-operate with the other Powers, or are we to stand alone? Can we dissociate ourselves from the others and preserve our self-respect, while they are guarding concessions which shelter American lives and properties? Let the President understand that in any such crisis, which calls for complete unity of action between the United States and the other Powers, that you are with him. Strengthen his hand! The American commercial community in China expect you to stand by them in their appeal for international co-operation. There is no other honorable way out.

The Other Cheek

THE Nanking Outrage should be dead and forgotten, for other events in China crop up to detract attention from it. Yet, everyday something happens to recall it to the memory of Chinese and foreigners alike. The missionaries were the principal sufferers. They had given their lives for the benefit of the Chinese people; yet they were driven out of Nanking like mangy curs. Dr. John E. Williams, vice-President of Nanking University, was murdered in cold blood by a Communistic soldier of the 6th Nationalist Army under the command of General Chen Chien. That bloody act will never be forgotten by the Americans in China or by the many Chinese who knew and loved this man.

It would have been expected that his family would be demanding reprisals by the American Government for this miserable deed of ingratitude. Instead, they sweetly turn the other cheek. In an interview published in the *New York Times* on May 16, 1927, the widow, Mrs. Williams, is reported to have said:

"To us the most impressive thing in the whole incident in Nanking was the great love and instant response of all Chinese students, Faculty, Christians and servants. The news of the death of Dr. Williams within ten minutes was all over the city, and with one accord they sprang into action as though an electric shock had gone through the entire community, and by their sacrifice of self and money and clothes, and even at the risk of all their lives, they tried to save the other foreigners."

"We do believe so firmly that if the conservative group can maintain their position and power that the very best forces in China will back them, and that China will work out her own salvation."

"After the events at Nanking many of the Chinese in Shanghai who had supported the revolution came to us to tell us that that one incident showed them that it was communism that had crept into their revolution, that now it became a clear-cut issue between nationalism and communism. They said that communism or the success of the red wing would mean death and destruction to China as well as to the rest of the world."

"We believe in the Nationalist cause and that the conservative group will be able to work out the salvation of China. In it we see the only possibility for a united country, and believe that China can work it out without intervention, and always we have absolute faith in the Chinese with whom we have worked. It was not China that was responsible for the situation at Nanking; it came from outside."

But there is another side to this picture. Missionaries who have returned to the United States from China have found that they have been met by a stern determination on the part of the mission boards at Home that they should not talk, that they should not tell the truth of events in Nanking lest the American people grow angered and refuse to send further funds for missionary work in China. These men are faced by a curious dilemma. Is

it more Christian to suppress the truth so that funds can be raised for continued missionary activity in China than it is to tell the exact truth and get no funds for spreading the Gospel? To a layman, this would not present a difficult problem. For how can one be a Christian and lie? Yet, missionaries in meeting and conferences discuss this problem with all seriousness.

Correspondence

July 1, 1927

The Editor,

THE FAR EASTERN REVIEW,

16, Jinkee Road,

Present.

DEAR SIR,

THE NEW CUSTOM HOUSE.

In your interesting review of Shanghai's New Billion-Dollar Skyline you gave the following name as being Contractors for the Custom House:—

"Tower Clock, J. B. Joyce & Co; Interior Clocks, Gent & Co. "Pulsynetic"; Bells, Taylor Bell Foundry; Glass for Clock Faces, J. B. Joyce & Co."

We are the Contractors for the supply and installation of all these items and shall be obliged if you will publish this correction in you next issue.

Yours faithfully,

INNISS & RIDDLE (CHINA) LTD.

A. J. PERCIVAL,

Managing Director.

The Japanese Troops in Shantung

THE Japanese Government, faced by the prospect of the shambling of the Shantung railway, which runs between Tsinanfu and Tsingtao, has been required to despatch troops to Tsinanfu. This has been regarded in many quarters as a move specifically aimed at the Nationalist Government in Nanking. Dr. C. C. Wu, Minister of Foreign Affairs of the Nationalist Government, has so regarded it. It is, however, not accurate to assume that Japan is taking any active part at all in the internal affairs of China. The Japanese Government and the Japanese people have no interest in the victory of one side or the other in the current Chinese situation. There are concerned with peace here, so that the lives and the properties of their nationals in China will be safe, and that foreigners, particularly Japanese, who live in this country will be able to go about their affairs without constant danger from military forces. Japan has a special interest in the Shantung situation which has already been discussed in previous issues of this journal but which may be re-stated simply as being based upon the fact that had Japan declined to return Shantung to China there was no power in the world that could have forced her to take that step, but when the step was taken it was with the understanding that the Chinese Government would maintain unimpaired the Shantung railroad as an artery of trade.

Subsequent to the sending of Japanese troops to Tsingtao events occurred in Tsingtao which justified the Japanese policy. Marshal Feng Yu-hsiang, the notorious "Christian General," who has been responsible more than any other man for the confusion in Chinese political affairs, engineered a mutiny in Tsingtao in which a General Chen, a commander of 2,000 troops, staged a mutiny against his superiors and attempting to utilize Tsingtao as a base, started a war entirely on his own in the province of Shantung. It is important to note that this mutiny was not a revolutionary effort in the interests of the Nationalist Government, and therefore the disorders which might have befallen the province of Shantung had this mutiny succeeded cannot be excused on the ground that China

is in the throes of a revolution. This mutiny was a feudal effort in which a corrupting General purchased a general who is at the head of a small body of mercenaries, and utilizing this force he set out to destroy the economic and political life of one of China's most important provinces. Such events as these lead to this modified form of intervention, in which none of the principal powers participate without considerable hesitation, for all the powers seek to give China a square deal and to avoid the embarrassments of strong powers attacking a weak one.

The following statement was issued by the Japanese Government immediately after reaching a decision to send troops to the interior of Shantung:

"In May last the Japanese Government, in view of the present commotion in China, dispatched to Tsingtao as a precautionary measure for the protection of the 2,000 or so Japanese residents in Tsinan, whither, in time of need, the troops could be sent from Tsingtao. We are now informed that there is a fear of Chinese troops opening hostilities in the Shantung districts, especially along the railway between Tsinan and Tsingtao, and the danger of disturbance there has become imminent.

"This situation gives ground for fear that, unless the troops are sent immediately to Tsinan at this juncture, it may become impossible for them to proceed there owing to such obstacles as the cutting of railway communication, thereby rendering futile the plan for the protection of our numerous nationals in the district of Tsinan, which is the object of the despatch of troops. The Japanese Government, therefore, in accordance with the statement made at the time of the despatch of troops to Tsingtao, have now decided to send the troops at once from Tsingtao to Tsinan.

"It is needless to reiterate that this is an emergency measure of self-defence for the security of Japanese residents and implies no intention other than protecting our nationals, which, no doubt, will be well understood at home and abroad."

Japan Is Not Dependent Upon China

THERE seems to be a misunderstanding throughout the world with regard to Japan's economic position in China. The general assumption is that Japan is entirely dependent upon China for raw materials and food supplies, and that should Japanese products be boycotted in the China market, Japanese industry will be destroyed. This assumption arises from the fact that Japan as, to a very large extent, concentrated on the China market, and that the Chinese have found it to their advantage to purchase their commodities from Japan. The boycott of Japanese goods in 1919 and 1920 very seriously affected Japan's economic position and since that time Japanese commercial houses have sought for new markets which can consume their products and which can supply them with such raw materials as their industries require. At the present moment, therefore, when there is a new anti-Japanese movement in South China, the Japanese firms do not seem to be at all worried by the prospect, and freely state that they are prepared to meet any conditions which may arise.

The assumption that the balance of trade between China and Japan is in favor of China is not quite correct, as although there is a small favorable balance between the two countries, when Japan's dependencies, Korea and Formosa are included in the figures, the balance is equalised. The principle articles which Japan sells to China are cotton yarns and cotton fabrics. These commodities are international cargo which can be sold anywhere in the world if the price for the Japanese commodity is competitive with similar commodities produced elsewhere. As a matter of fact, Japan has been developing a huge market in this commodity in the South Sea countries and in Africa and Japanese mercantile firms believe that they can divert any goods which cannot be consumed in China to these other countries. China only consumes approximately 50

per cent. of Japan's entire trade in these commodities. Japan also sells to China large quantities of sugar, but Japan raises no sugar and purchases the commodity in Java to sell it to China. There would be no visible economic loss to Japan should she have to forego this trade.

There is nothing which Japan buys from China which could not be purchased elsewhere. The largest commodity exported from China to Japan is raw cotton of the short staple type, which is used for bedding in Japan and most of which is purchased in North China and shipped from Tientsin. This particular commodity can be purchased elsewhere, and for the requirements of Japan, there is little difference between the long staple and the short staple cotton. The advantage of purchasing in China is the shorter haul, reducing the freight charges, but should economic conditions in China make it difficult for the Japanese to obtain their supplies here, they will find it cheaper to purchase elsewhere.

Beans and bean products, which are the next highest item purchased in China by Japan come entirely from Manchuria, in which Japan has control of a railway zone and the largest port, Dairen, and therefore, this commodity presents no problem.

Japan only purchases three per cent. of the iron ore consumed in that country in China. Although Japan made arrangements for obtaining iron ore in China, by modernizing the Hanyehping at a tremendous cost, Japan has received no iron ore from the Hanyehping for more than two years, and this has not at all affected the Japanese iron and steel industry, which has been able to obtain ores in India and Singapore.

It is interesting to note that in all discussions with regard to the boycott, the anti-Japanese committee have provided that there

shall be no boycott of Japanese coal and paper because, although China has enormous coal fields, she is entirely dependent upon Japan for these two commodities, coal and paper. The nearest competitive coal fields are in Australia, the haul from which would make the coal expensive, although not as expensive as English and American coal. There is a possibility that should all Japanese commodities except coal be boycotted, the Japanese will decline to sell coal to China and will adopt the view that if the Chinese decline to do business with Japan in goods which Japan seeks to sell in China, then the Japanese will refuse to sell to China goods which they can sell elsewhere, but which the Chinese find it difficult to purchase elsewhere.

The Chinese suffer from a lack of a statistical sense. They have the curious idea that the China market is an absolute necessity to commercial nations and that unless those nations buy and sell in China they will go under economically. As a matter of fact, when the Hankow Government wiped out all foreign trade by its Communistic measures, the firms which suffered in Hankow continued to do business elsewhere in the world, and rather than the foreign firms suffering the people of Hankow suffered until they begged the foreign firms to return to their city and to give employment to the thousands of Chinese who had been misled by Chinese and Russian Communists. The anti-Japanese boycott in South China is ending in failure but it does not matter so much whether this particular boycott ends in failure, if the Chinese themselves do not realize that the economic boycott is a stupid weapon in the modern economic world, when great firms with huge capital can swing their products from one part of the world to another as trade conditions warrant.

New Stand By Nanking

The Nanking Government has adopted an attitude toward boycotts and strikes which differs entirely from that taken by other Chinese Governments. The following statement issued by the official, *Kuo Min News Agency* is of the greatest significance:

The following proclamation is jointly issued by the Defence Commander, General Yang Hu, and the Special Municipality of the Port of Shanghai and Woosung, cautioning the people against resorting to puerile conduct in their patriotic manifestations:—

"The economic importance of Shanghai makes it the ultimate factor in the military preparation for the present campaign.

"While the war in front is making substantial progress, the needs to appropriate war funds and to consolidate this economic base becomes ever the more paramount.

"It therefore behooves us to impress again on the minds of the people and the leaders of the various organizations, the necessity

of whole-hearted co-operation in maintaining order and stability that the campaign can proceed unimpeded.

"Regarding the foreign policy, the people of Shanghai should have confidence in the sagacity of the Government. The Government will assume full responsibility; and the people are advised not to take upon their own to deal with whatever foreign question. Such interference on the part of the people will necessarily lead to confusion in foreign policy and hamper the effort of the authority in maintaining order.

"The foreign policy of the Nationalist Government and Kuomintang has been time and again reiterated by the Central Executive Committee, which, no doubt, is clearly understood by all people.

"The Special Municipality of the Port of Shanghai and Woosung and the Defence Commissioner were again instructed by the Government to this effect:

"While the northern expedition is still in progress and the Communists are still at large it is important to watch carefully any popular movement expressive of diplomatic opinion. The Central Kuomintang Headquarters, had already instructed headquarters of respective localities to this effect, yet we learn that the anti-foreign movement in Shanghai becomes more vigorous and intensified every day.

"It was reported that such vigorous measures as foreign shops to close down, confiscating commodities, etc., were taken. This is indeed very deplorable and is the height of unwisdom. It would be almost suicidal, if it ever develops into something of a general strike, which would amount to willingly playing into the hands of the Communists.

"The Government, need it be said, is always in heartfelt sympathy with the patriotic manifestation of the people, yet this does not mean that the Government can countenance any such acts that may endanger general peace and order and disturb the rear of the fighting army. Any such acts will be vigorously dealt with by the Government.

"The Mayor and the Defence Commissioner are, therefore, accordingly requested to caution and to restrict the people from resorting to any such puerile conduct, and be not sparing in meting out punishment when such acts are committed.

"In respect to the above instruction from the Government, we therefore issue this proclamation: forbidding any such acts as arresting people without proper authorization, closing up shops and other acts calculated to endanger the peace and order and to disturb the financial stability. Violation of this proclamation will be seriously punished and the people are advised to pay heed to this warning."

The American Policy in China Stated

THERE is often wonder as to exactly what is the American Policy in China. Individual Americans expressing their personal viewpoints have perhaps confused the issue by a constant reiteration of personal statements of their ideas as to the American Government's attitude in China. There have, of course, been official statements by Secretary of State Kellogg, but these seem to have been ignored in the welter and confusion of personal opinion.

With regard to the Nanking Outrage some Americans have sought to give the impression that the officers of the navy acted without the consent of their Government in setting up a barrage to save the lives of American men, women and children whose property had already been violated and whose lives were in danger because of the presence of Communist troops in Nanking, who openly stated their determination to murder all the foreigners in the city.

The American naval officers were faced with the problem of either following their own judgment and saving their fellow countrymen or of risking the lives of these people while they were waiting for orders from home. Following the historical traditions of the United States navy, the officers of which save life first and think of the consequences afterwards, Rear-Admiral H. H. Hough and Commander Roy C. Smith, Jr., of the Destroyer Noa, took the chance that

only big men can take and ran a barrage about Socony Hill, under which American citizens, who had taken refuge there, crossed to safety.

When Commander Smith laid down the barrage, he said, to Lieutenant Benjamin F. Staud, "I'll either get a medal or a court martial for this—let her go, Bennie." There are a few Americans in China, who have become so denationalized as to favor that Commander Smith should receive a court martial, but the majority of Americans in this country look forward to Congress, when it meets in December, giving him the encouragement which a fearless and clear-thinking naval officer deserves when he places the welfare of his fellow citizens above every other consideration. That Commander Smith will not receive a court martial we now know; that he has been sighted for bravery we also know from the following correspondence, which has unfortunately received too little notice in the Far East:

Secretary Wilbur's letter said: "The department notes with pleasure the extracts from the reports of Rear-Admiral H. H. Hough, commanding the Yangtze patrol, and Admiral C. S. Williams, commander-in-Chief of the Asiatic fleet, on the part played by the Noa and Preston in the Nanking incident. The department commends you for your timely action in protecting lives and property so excellently executed on this occasion."

Admiral Hough's report said :

"The patrol commander is certain that the opportune opening of fire by the Noa and Preston (American destroyers) and Emerald (British cruiser) not only saved the lives of foreigners in the Standard Oil house, but preserved the lives of all foreigners remaining in the city. He considers the decision of Lieutenant Commander Smith to open fire was not only wise and justified, but that it was the only possible method by which the situation could be saved. He regards the barrage as a smart operation excellently executed, and he takes pride in the efficiency displayed by the Noa and Preston.

"The patrol commander desires to express his thorough appreciation of the excellent, cool-headed judgment and efficiency displayed by Lieutenant Commander Smith throughout his extremely trying duties as senior officer present during this emergency and recommends that this correspondence be made, a part of his official record."

Admiral William's indorsement said :

"The Commander-in-Chief desires to express his unqualified approval of the actions of the senior American naval officer present at Nanking. It is believed that force was used only as a last resort. Further, that the force used, namely, the barrage from the warships, upon Standard Oil Hill, was restricted to the minimum firing necessary to allow the foreigners to escape; that the injury to Chinese, other than looters, and the damage to Chinese property by this bombardment, was negligible. The best testimony available indicates the effect of this firing was not only the rescue of the American Consul and party, but of all other foreigners in the city."

It is to be hoped that American representative bodies in China will take steps to obtain from Congress a suitable recognition of those brave naval officers and men, whose sound judgment and whose personal daring prevented a massacre at Nanking.

British Trade and Industry

By Gilbert C. Layton, Assistant Editor of "The Economist"

SPECIAL TO THE "FAR EASTERN REVIEW."

The Coal Trade

APPROXIMATELY six months have passed since work was resumed in the British coal fields after the prolonged stoppage. It is, therefore, opportune to review the present position of the industry and to indicate the probable lines of development in the future. The situation is summed up by the word "disappointing." The outstanding feature of the international coal position has for some time been over-production. For instance, France and Germany are experiencing difficulty in finding markets and stocks are accumulating. This over-production was bound to react upon the British industry. Moreover, there was an added handicap because coal continued to flow into this country for some time after work was resumed. It is thus not surprising that there has been no increase in the output of coal or in the volume of the export trade and in some areas prices have declined to even lower levels than those obtaining in the Spring of 1926, when the mines were being substantially subsidised by the State. Owing to the longer hours worked, however, there has been an increase in the productiveness per person employed, but not on the average to the extent anticipated. As for the cost of production, figures covering the whole industry are not available, but those published indicate reductions ranging from 2s. 11d per ton in Northumberland to 11d per ton in Scotland. Wage reductions on a considerable scale are expected to take place in many coal fields shortly.

The increase in individual outputs has been greatest in the coal exporting districts, the maximum point being reached in Durham. The quantity exported as cargo and bunkers in the first four months of the year is 22.5 million tons as compared with 22.8 million tons in the corresponding period of last year. The future is not viewed with confidence. A report from the North of England states that the "Northern coal trade shows no sign of improvement and the outlook is very discouraging." The conditions in the steam coal trade of South Wales are described as "Very unsatisfactory, and at the moment there appears to be nothing on the horizon to raise hopes of an improvement in the near future." The French Government's restrictions on imports of coal provide additional ground for anxiety.

The Iron and Steel Outlook

The iron and steel industry is closely affected by conditions in the coal industry. The former, however, has been more fortunate than the latter. Up to the present production has been maintained at a high level and prices, especially in the earlier months of the year, were satisfactory. The production of steel ingots and castings for one month this year was the highest since the war. Thus the March production was returned at 949,600 tons and this rate of production was approximately maintained in April, for though the figure was 850,100, the Easter holidays interrupted operations. The total production of steel ingots and castings for the first four months of this year amounts to 3,357,200 tons as compared with 2,789,300 tons for the corresponding period of last year. The

production of pig-iron has also been maintained at a satisfactory level. The output for the first four months of 1927 totals 2,357,500 tons, in comparison with 2,143,000 tons in 1926. The imports of iron and steel, however, continue to be fairly high.

But iron and steel masters will, it would seem, find the future less profitable than the recent past. The high production figures which have been noted are largely due to the over taking of arrears of production resulting from the strike. New orders are not coming forward in an encouraging volume. This is all the more disquieting since considerable reductions in prices have been made recently. Several furnaces have been blown out and the possibility of others being damped down is being discussed. Though some plants have fuller order books than others, there is general concern regarding the slackness of present demand.

The Motor Industry

There is every indication that this year will witness a further advance in the popularity of motoring in Britain. This tendency has been apparent during the past few years. Thus in 1926 the production of private cars numbered 158,700, valued at £43,162,000, which compares with 133,500, valued at £41,566,000, in 1925, and 107,000, valued at £36,500,000, in 1924. Nor are there any signs that saturation point has been reached. The output figures show continuous expansion in the production of cars of 14 horse power and under, this being due to the method of taxation adopted by the Treasury, which fixes the duty on the basis of horse power. In 1926 the output of 12 horse power cars represented over 51 per cent. of the total British production and it is in this section that price reductions have been greatest. The figures of sales of cars prove that the British companies are more than holding their own in the home market. Of the new cars licensed in 1926, 86 per cent. were built by British makers for home sales, the corresponding percentages being 69 per cent. in 1925, 70 per cent. in 1924 and 49 per cent. in 1922.

There is some criticism of manufacturers, however, on the ground that they do not pay adequate attention to the needs of overseas markets, but it appears that this criticism is beginning to bear fruit. Again, the selling organization of manufacturers is held to be capable of improvement. At present there are about 50 concerns responsible for the output of cars in Great Britain and only two firms operate on genuine mass production lines, while distribution is carried out by a multiplicity of dealers. There can be little doubt that this state of affairs is not entirely satisfactory. But the finances of the companies do not reflect the expanding production which has been noted. Thus out of 17 companies whose reports and accounts were recently published, only two were able to show an increase in profits as compared with the previous year. These two companies, it is noteworthy, manufacture commercial vehicles. No more than six companies paid an ordinary dividend. The majority of undertakings still bear the scars of the misfortunes of the early post-war years.



The Bulb Making Plant in Shanghai

An American Factory in China

A Triumph and a Tribute for American Methods of Factory Management—China General Edison Company Operates Through Strikes, Boycotts and Revolution

TO the average foreigner who has viewed from a distance the rapidly moving political drama of the last two years in China—after Hankow, Wanhhsien, Nanking and scores of other incidents advertised beyond all proportion—what is here inscribed will sound like a strange contradiction. For this is the story of an American factory operating in China during these years of boycotts, strikes, revolution and violence, which not only survived with scarcely the loss of a single working day and no strikes at all, but has expanded to meet the demands of a growing market, afforded its 500 Chinese employes a certain and steady income, and looks to the future with a confidence of still greater business and stability.

The story should really go back ten years, when the China General Edison Company, a subsidiary of the General Electric, Co. of America, first opened its factory on a large area of ground in the newer western industrial district of Shanghai, on Robison Road. Beginning with a small plant for the production of incandescent bulbs, the establishment has grown to include a porcelain factory, where many kinds of electric fixtures are made, color spraying and bulb-blowing plants, and other auxiliaries, the whole incorporating all the developments of the last decade in the lamp-making industry, and to-day producing half the bulbs that are used in China, and exporting besides a good proportion of those that are bought in Malaysia and the Philippines—an output of more than 3,000,000 lamps a year.

Operating on a plane that is the antithesis of exploitation, during the thick of the troubles which Shanghai has experienced in the early months of 1927, the factory continued uninterruptedly, producing in the neighborhood of 10,000 lamps a day, the Chinese employes, constituting 99½ per cent. of those on the roster, punching the time-clock regularly and paying little heed to the agitation which was going on about them.

As one goes through the factory and takes a glance at the faces of the men and women at work there, notes the camaraderie which exists between employer and factory hand, between Chinese superintendent and the machine-operator, one begins to understand how this miraculous freedom from labor troubles could come to pass and to what a marked extent American methods of factory management have succeeded in this country, which 20 years ago had been thought so primitive and so far removed from the culture of the West as to be an impossible field.

One realizes also that the most "occult" and "inscrutable" attribute about the Oriental mind was the fact that in times gone by there were so few persons who took the trouble to examine it, that the Chinese worker has characteristics in common with the

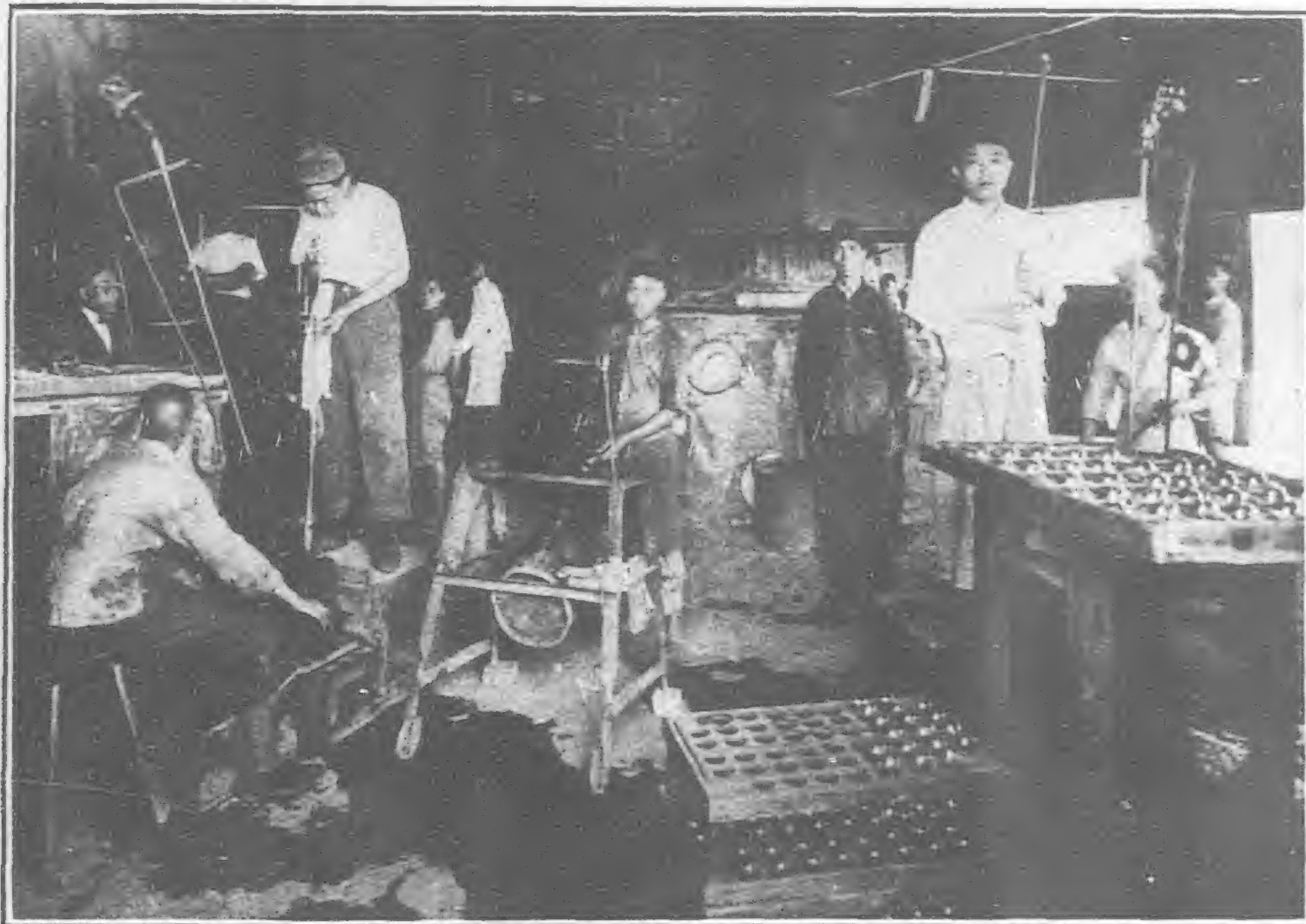
workers of other races, that human nature is not radically different on opposite sides of the globe, that the native here is just as responsive to fair treatment and just as loyal as the laborer of the Occident. More specifically, the success of this American factory demonstrates conclusively its superiority over the old compradore system, which is essentially similar to the now passe "padre" system in the Italian laboring gangs in pioneer America.

The Chinese employe in the General Edison Company is paid by a company official directly, the pay being wrapped in an envelope and addressed to him, rather than to a labor parasite. The worker in addition is given facilities for recreation on the factory premises, where there are golf links, tennis courts, football and baseball fields, and an outdoor basketball court. Inter-departmental teams play throughout the year at these various sports and the factory teams engage in competition with outside institutions. Rest-rooms for the employes, where there are periodicals in the vernacular, and provision for comfort during leisure hours, have been erected. Each worker is carefully trained to his task over a long period by one of the Chinese superintendents, until he becomes gradually initiated, as it were, into this large family of workers. In general there is no night work, except in the glass melting furnaces, and no Sunday work, there is no child labor under 16 years of age.

The minimum wage is 50 cents a day for the men and 35 cents for the women, many of whom earn \$1.00 a day.

The result is a little Americanized industrial corner of China pervaded by a spirit of contentment, an air of prosperity, a flood of sunlight, that is a sharp contrast to the less tolerable labor conditions elsewhere, conditions which have given rise to much of the unrest in China. The mutual advantages of the American system both to worker and to employer are so pronounced that a number of other plants in and about Shanghai are either contemplating the adoption of similar measures, or else are giving serious study to these methods. The factory has attracted attention among the universities and technical schools in China so much that groups of students are frequently shown through the Edison plant.

Missionaries even have commented upon the conduct of the factory as being free from the charge of exploiting the cheap labor of China that usually is heaped indiscriminately upon business interests here. That the factory has given employment of a high order over a period of ten years to more than 500 Chinese and is run, with the exception of four Americans, by Chinese, has won the respect and approval of Chinese investigators, however chauvinistically inclined. The lamps produced here in competition with European products, are put on the market at 40 per cent. below the price that obtains in the American market.



The Glass Blowing Room

As will be revealed in the illustrations, the China General Edison Company started its enterprise with a vision of a rapid expansion of trade concurrent with a widespread electrical development in China. An area of 139 mow, considerably larger than ever has been utilised in these first ten years, was purchased with this expansion in view. Although there has been a slight annual advance in the output, the development of the huge market anticipated has not taken place, and a good part of the investment consequently has been lying idle, awaiting the opportunity, which now seems further postponed than at any time, but the factory continues at a near-capacity production.

The organization of this factory in some detail was outlined in an article appearing in the "Far Eastern Review" in 1922, but so many changes have taken place since that time that it would seem expedient, in order to round out the picture of the workings of this unique establishment, to trace the articles produced there through all the stages from the raw material to the finished lamp and electric fixture.

Substantially the system employed in the manufacture of the electric bulb is the same as obtains in America. The first process in the lamp factory is the breaking of little glass tubes, about 8mm. in diameter into small lengths to be fashioned into the stem that holds the filament. Much of this glass is made in the Company's plant and a good deal imported from America. Once chopped into short lengths, the glass passes through three machines, a "hub" machine, which bevels one of its ends, a flare machine which inserts under heat and with sewing-machine regularity, the little tungsten wires upon which the filament is strung, and a stem machine, which, again under heat, seals the end of the tube once the wires that carry the current are embedded. Then follow the processes of coiling the wire, inserting into each bulb the filament, extracting the air to within a fraction of a thousandths of a millimeter of a perfect vacuum, sealing it and cementing on the brassy yellow socket.

All this is done by machine, but there is a radical departure from the methods elsewhere in the inspection of each piece of work after each one of the processes, and a check on the inspection which guards against the discovery of any one of the 300 possible defects after the article is finished. In the illustration showing the interior of the factory all these machines are visible in operation. Packing and sending to the godown for shipment complete the factory's work.

On the opposite side of the General Edison Company's ground is the glass-blowing plant, in

which the sand brought from Kwantung is fused in a furnace with red lead, soda and other chemicals, and small particles are removed on the ends of tubes from the pot by sixteen expert blowers who with one puff expand the glass to the size of the mould. This process in the United States is now done by machine.

Although most of the bulbs produced, as might be expected, are of 40-watt capacity, the factory has a varied output, of lamps ranging from 2½ watts in power to 500 watts and from 10 volts to 260 volts. In the latest lamps a new coil filament of Tungsten wire is used, the thinnest of which is .0005 of an inch in diameter. This is reduced to such an infinitesimal size by passing it through a diamond die.

Another innovation of which the factory is exceedingly proud is the recently developed internally frosted lamps, overcoming the handicap encountered in the old frosted lamps, from which the outer coating was scratched when cleaning. The new frosted lamps have just been put on the market and are proving popular. This is a General Electric patent. Bulbs coated in a variety of colors likewise are turned out here.

In the porcelain plant has been developed a system almost as involved as in the lamp factory.

Here the porcelain, is made by baking specially prepared clay. From this half-finished product, it is cut by dies into a variety of shapes for insulated switches and other wall and ceiling fixtures, then sprayed with a glaze and baked a second time in a larger furnace for a period of thirty hours, it requiring that length of time for the proper heat to be attained in the brick kiln and an equal period for it to cool off before and after each baking.

From this plant, which is adjacent to the bulb-blowing factory, the fixtures are shipped to Mexico, Cuba, South America, South Africa, the Philippines, Java and Malay, as well as enjoying a large sale in China. Here, however, there is competition with Chinese and Japanese products which is becoming increasingly keener.

To Mr. H. E. Page of the General Electric Company belongs the credit for having developed this unusual organization. When the plant first started operating in 1917, he brought with him several Chinese who had graduated from universities in the United States and been given preliminary training in the General Electric laboratories and factories in America. Two of these students, Mr. Non Lam, who graduated from Purdue and Mr. Shen, Cornell are still in the factory, the former superintendent of the lamp factory and the other in charge of the glass plant. A third, Mr. C. M. Yeh, of Purdue, is on a "sabbatical" year in America, as it is the policy of the Company to send its engineers back for a course of study at intervals, Lam having returned from a trip to America last October.

(Continued on page 296)



The Bulb Room

America's Foreign Trade

By James A. Farrell, President of the United States Steel Corporation, Chairman of the National Foreign Trade Council

THROUGHOUT the proceedings of this Convention, (National Foreign Trade Council) which is now drawing to a close, you have heard that the foreign trade of the United States last year continued to make substantially the same rate of growth that has marked its course for the last decade. Both exports and imports were greater in volume than they have ever been before.

Some phases of our present trade position are of particular interest. Europe's proportion of our exports is 14 per cent. less than it was twelve years ago and Europe furnishes 20½ per cent. less of our imports than she did, in the average, during the 1910-1914 period. It is when other parts of the world are taken into account that the real development of our trade is clearly disclosed. While Europe's percentage of our trade has decreased during the last twelve years, the share of each of the other major divisions of the world has increased. We are selling more as we buy more, and that is as it should be. Imports from Asia, for example, have quadrupled in that time; and exports to Asia have more than quadrupled. This is a plain fact from the trade statistics.

These figures comprehend our visible trade; exports and imports of merchandise, raw materials, semi-finished or partly processed products of manufacture and completely finished articles ready for consumption. It tells the story of our trade opportunities.

When we come, however, to consider the balances of trade between countries, there are other items which must be taken into account, aside from the commodity balance of trade; more particularly, services, shipments of gold, and remittances in currency or credit documents from people in one country to relatives or others in other countries. The balance will be struck ultimately between total exchanges of all kinds rather than between exchanges of goods alone. To reach that balance with any approximation to the truth, the figures and estimates for all the world must be considered.

The time has gone by when direct balances between separate nations can be struck accurately without reference to other countries, or when these direct balances can be taken as a criterion of the actual trade positions of these countries. The world has become one market. It is a vast composite of many sections which, to suit our political convenience, we call empires, nations and countries but which, in fact, in so far as trade is concerned, have been welded together by the developments of recent years in those two fundamentals, transportation and communication.

It is true we may make statements of account between two nations with practical accuracy. But it is as futile to seek to maintain an even balance in the exchange of goods between any two nations of the world as it would be, for example, to demand that the trade of any two of our states should show an even balance. We may almost as reasonably talk of even trade between Rhode Island and Michigan as between the United States

and Argentina, or between the United States and Great Britain.

Countries which see something disadvantageous in their adverse trade balances with the United States should take into consideration their indirect trade and, should they still desire a more even balance in their direct trade with us, study means of increasing the range of their products which may be saleable in this country. There are, on the other hand, many markets of the world where the United States buys much more than it sells.

We recognize the fact that in such markets our purchases furnish a supply of dollar exchange which, transferred in due course to other countries, enables other countries to buy from us more than they sell to us.

Or else it becomes a problem for our enterprise and initiative. What can we produce that will find sale in those markets? How shall it be merchandised? How shall we meet this challenge to our skill and our service?

Surely not by invoking the aid of regulatory measures that invite retaliation and promote friction, or by introducing contentious questions of international policy. Rather by increased effort to understand and meet the wants and desires of those markets.

There may be cases when an even balance of exports and imports is impossible of attainment even if we were able to make the assumption that it would be desirable. Our trade with the Straits Settlements shows that one item of our imports from that country is twenty times as much as all of our exports to that country, and another of our imports is valued at five times all our exports to that country.

Balancing this trade would involve a growth of population in the Straits Settlements and a change in their manner of life that are both beyond the limits of reasonable expectation. Attempts on our part, by regulation or other artificial means to force an even balance there, would result only in curtailment of supplies which are necessary to our daily life. It would mean discomfort to us and instead of benefiting them would correspondingly injure their general condition. This is, of course, an extreme illustration, but the principle involved fits every case wherever it may arise.

The suggestion comes to us not infrequently that we do not buy as much from certain countries as they buy from us. We have all heard, very recently, representatives from some of those countries speaking openly about measures that may be taken to compel a readjustment so that their sales to us shall more nearly equal our sales to them. It has even been hinted that an embargo will be laid on United States commerce despite the fact that we buy from South America as a whole over a hundred million dollars worth annually more than they buy from us.

I venture to suggest that such schemes are unwise, im-



James Augustine Farrell

practicable and, above all, uneconomic. Measures of this kind inevitably provoke retorts in kind, and often in greater degree, invariably to the detriment of both sides. Wiser measures much more certain to produce beneficial results have the added advantage of being easier to operate, of moving along with, instead of against natural economic channels.

Fourteenth National Foreign Trade Convention

Moreover, the demand for an even balance of visible trade fails to take into account certain fundamentals of all trade, international or domestic, which in the end are always controlling. The chief object of any producer is to sell substantially all his products at as remunerative prices as he can get. That way lies the profit of the whole operation, as we have often set forth. It is consequently a matter of indifference whether the sale is in Buluwayo, Christmas Island or New York. Procedure effecting the sale, and in delivery of the goods, may be greatly different in cases so widely separated as those cited, but precisely the same principle is involved in each. A manufacturer who produces a thousand machines a year has a thousand machines to sell, and each one sold reduces his problem by exactly one one-thousandth, no matter who or where the buyer may be.

It is to be remembered that markets are elastic not fixed. There is never a rigid limit to the capacity of any field. No one can foretell accurately what effect any new product will have, either on its own immediate market or on others far removed. The sale in the United States of a certain delicacy helped Ecuador out of a period of depression by increasing our demand for her cocoa. Ecuador got a new and unexpected supply of American dollars with which she bought various things that she wanted, including American made pianos. The man who originated the idea of coating a slab of ice cream with chocolate probably never dreamed that he was helping to increase the foreign trade of the United States.

The coming summer in the United States is foreshadowed or reflected in the export trade of twenty or twenty-five other countries all of which contribute to the enjoyment of American outdoor life during the warm months. These things, and others of similar import, are entitled to consideration by our friends in different countries around the world who are suggesting counter measures compelling us to buy from them directly in amounts equal to what they buy directly from us. They should remember that the world is a composite whole and that the purchase of any of its products anywhere has its inevitable reflexive effect everywhere else.

We buy annually from Brazil, for instance, nearly three times as much as she buys from us. Coffee is the chief item of our purchases in Brazil. Suppose we were to adopt the plan of arbitrary regulation and limit our purchases from Brazil to an amount equal to her purchases from us. What would be the result?

Many Americans would have to cut down their consumption of coffee and for what they did use they would have to pay a much higher price. But that would really be only an incident. The chief result would be the general disruption and demoralization of Brazil's commerce with other countries, that would certainly be reflected elsewhere.

Brazil would be deprived of the dollars with which she now buys much of what she requires in Europe or other parts of the world. She would have coffee only with which to pay, instead of dollars, whereas those countries want the dollars, not the coffee. They buy as it is what coffee they want, almost one-fifth in the aggregate of the Brazilian crop, and have no use for any more. If they took more they would be obliged to resell it elsewhere, perhaps to us. Thus the only effect of such an attempt on our part would be to enforce trade readjustments elsewhere and force trade into new and uneconomic, because unnatural, channels.

Such schemes are devices to check trade, not to promote it. They react disadvantageously on those who try them. Their result is disaster, not profit. Trade grows with prosperity, not with depression. We do our full part as we follow that principle and when we help others to prosper, our own trade prospers accordingly.

The trade of Argentina with Brazil effectively illustrates this point. Brazil buys from Argentina annually something like ten million gold pesos more than Argentina buys from Brazil. Obviously a substantial part of Brazil's capacity to take that excess from Argentina arises from our own excess purchases from Brazil. The position of Argentina is the same as if we bought that amount

directly from her; she may very likely profit from the fact that the transaction is indirect.

It is neither necessary nor wise for any nation to insist upon an even exchange of goods with any and every other nation. What one buys anywhere enables the seller to buy where it finds its best advantage. It is the sum of all the purchases which balances with the sum of all the sales. The way to prosperity for the United States and for all other nations is along the line of increased production and lower cost, for that is what makes power to purchase and consume.

The international trade of the United States is growing steadily and no doubt will continue to prosper as the purchasing and consuming power of the rest of the world gains. But our growth will not be fortuitous or gratuitous. It will be the result of our own intelligent effort. It is recognized that we possess industrial skill and enterprise in high degree, but that alone will not suffice. We must also see the international picture in perspective and not rely on our economic self sufficiency. The development of our foreign trade is not only important but essential to our national growth. It is a problem which calls for the co-operation of all concerned.

Candy for China

The American invasion of China in some of its forms is just now unpopular with the masses of that country. Things foreign are objected to and Americans are leaving the country, but according to a news item in the American papers, this hostility is not stopping two shiploads of candy now on their way from the United States, with more to follow for Peking, Canton and other centers. Not long ago, Mr. Ling Sing-kui, spent some time in America investigating the operation and management of Five and Ten Cent Stores with the object of establishing a chain of similar stores through out China. In a newspaper interview, he said that the principal article to be sold over the counters of these stores was candy, of which the Chinese cannot get enough.

An American Factory in China

(Continued from page 294).

After establishing and managing the factory for some years, Mr. Page returned to the United States, recently, leaving Mr. J. S. King, who had been assistant manager for several years, temporarily in charge. With Mr. King are two American engineers, Mr. W. F. Woodhouse and Mr. Winslow, and an American stenographer, Miss Kay. These four comprise the foreign personnel of the factory and the remaining four hundred-odd are Chinese.

The electrical expansion that already has taken place in China, that there are now electric lighting plants, scattered in every important town throughout the country, that power installations in China total more than 400,000 k.w. and that there are more than 5,000,000 light sockets in Shanghai alone, all sounds impressive, but it is the smallest fraction of the development in other countries and about a third or a quarter of that which has taken place in Japan.

Each person in the United States it has been estimated consumes three electric light bulbs per year and the world's annual consumption is about a billion bulbs of every description. Consider, then, the area and population of China, and the paltry total of between five and six millions of lamps used there each year, and the potential size of the field will mount to a prodigious total. If, let us say, each Chinese, developed to the plane of each American, used three lamps per year, the total for China alone would exceed by two hundred million the total now being used by the entire world.

This most universally used electric appliance some day will have a tremendous sale in China, which now absorbs less than one per cent. of the world's output, and the foresight of the China General Edison Company, both in planning to supply the needs of a future industrialized China and in installing into its factory an American system of management, while making it in personnel a Chinese concern, except for one or two supervisors, will some day be rewarded.

For the present it is furnishing a livelihood to 500 Chinese and an example to a good part of this country in how to operate a factory on an efficient, humane basis.

The Osaka Municipal Water Works

Its Present Capacity and Extension Plan in Operation

By Eisaburo Kusano

THE Osaka Municipality is now extending the capacity of the Municipal water works at Kunishima in the suburbs of the city from the present maximum capacity of 83,370,000 gallons by about 43,670,000 gallons to a total of approximately 127,040,000 gallons; the extension work was commenced in 1925 to last for five years, at an estimated cost of Y.8,000,000.

The city of Osaka, Japan's industrial centre, having made a remarkable progress in all directions, the daily water consumption has also greatly increased in recent years. The per capita requirement of water, too, has increased to about one *koku* which corresponds to about 39.7 gallons, with a tendency to further heavy increases.

Upon materialization of the city construction plan of Greater Osaka, the Municipality has to increase the capacity of its water works in proportion to the subsequent increase of the demand for water. But, in view of the recent enormous increase in the water consumption, the Municipal authorities have recognized the necessity of resorting to an interim measure of extending the capacity of water works immediately, prior to the wholesale extension of the works in sequence of the realization of Greater Osaka.

In consideration of the foregoing necessity, the city authorities made, based on the statistics of the past several years, a careful comparative study of the increasing percentage of the population and the percentage of the water-supplied population against the non-supplied population in districts covered by the city water works. As the result, they have found the population in this district may increase to approximately 3,160,000 in 1936, and that 2,750,000 of whom will have to be furnished with water by the city water works.

On December 3, 1924, the Osaka City Assembly passed the Municipal plan of extending the capacity of the city water works at an estimated cost of Y.8,000,000, the disbursement of which spreading out to five years; the same plan was approved by the Minister of Home Affairs on April 10, 1925, and the extension work has thus been put into operation.

The foregoing extension of the city water works is based on the calculations that the maximum supply of water in 1936 will total approximately 3,200,000 *koku* or 127,040,000 gallons, the per capita consumption being 1.16 *koku* or about 46 gallons per diem.

As regards the methods of extending the capacity, it is proposed

that the supply capacity be increased (1) by about 570,000 *koku* or about 22,629,000 gallons by means of increasing the filtering speed of the present works from 12 feet to 16 feet, and (2) by about 530,000 *koku* or about 21,041,000 gallons by establishment of a new rapid filtration plant within the present premises of the Kunishima water works. The total increase amounts to 1,100,000 *koku* or about 43,670,000 gallons. When this total be added to the present capacity of 2,100,000 *koku* or 83,370,000 *koku*, the aggregate total capacity comes up to 3,200,000 *koku* or about 127,040,000 gallons.

Before going into details of the present extension plan, however, a brief history of the Osaka Municipal Water Works will be given.

History of Osaka Water Works

It was in about 1880 that the establishment of a water works was planned in Osaka, but the plan was not realized for the following 10 years, there having been various obstacles in the way. Thanks to the untiring efforts exerted by the Osaka Prefectural and Municipal authorities, however, the plan was approved by the City Assembly in July, 1891, and the actual construction was commenced in August of the following year. Three years later, that is, in October, 1895, it was completed.

In those days, the water was taken in from the Yodo-gawa River at Sakura-no-miya, and the clean water reservoir was established within the site of the Osaka castle. The cleansed water was distributed in the city by the natural following of the water through the water main which extended to nearly 200 miles. The cost of construction totalled Y.2,398,945.

First Phase of Extension

In April, 1897, the city of Osaka was enlarged as the result of the amalgamation with neighboring towns and villages. It

became necessary, subsequently, to extend the distribution water main, and it was extended by about 70 miles to 270 miles with the investment of Y.881,131. It was completed in December, 1901.

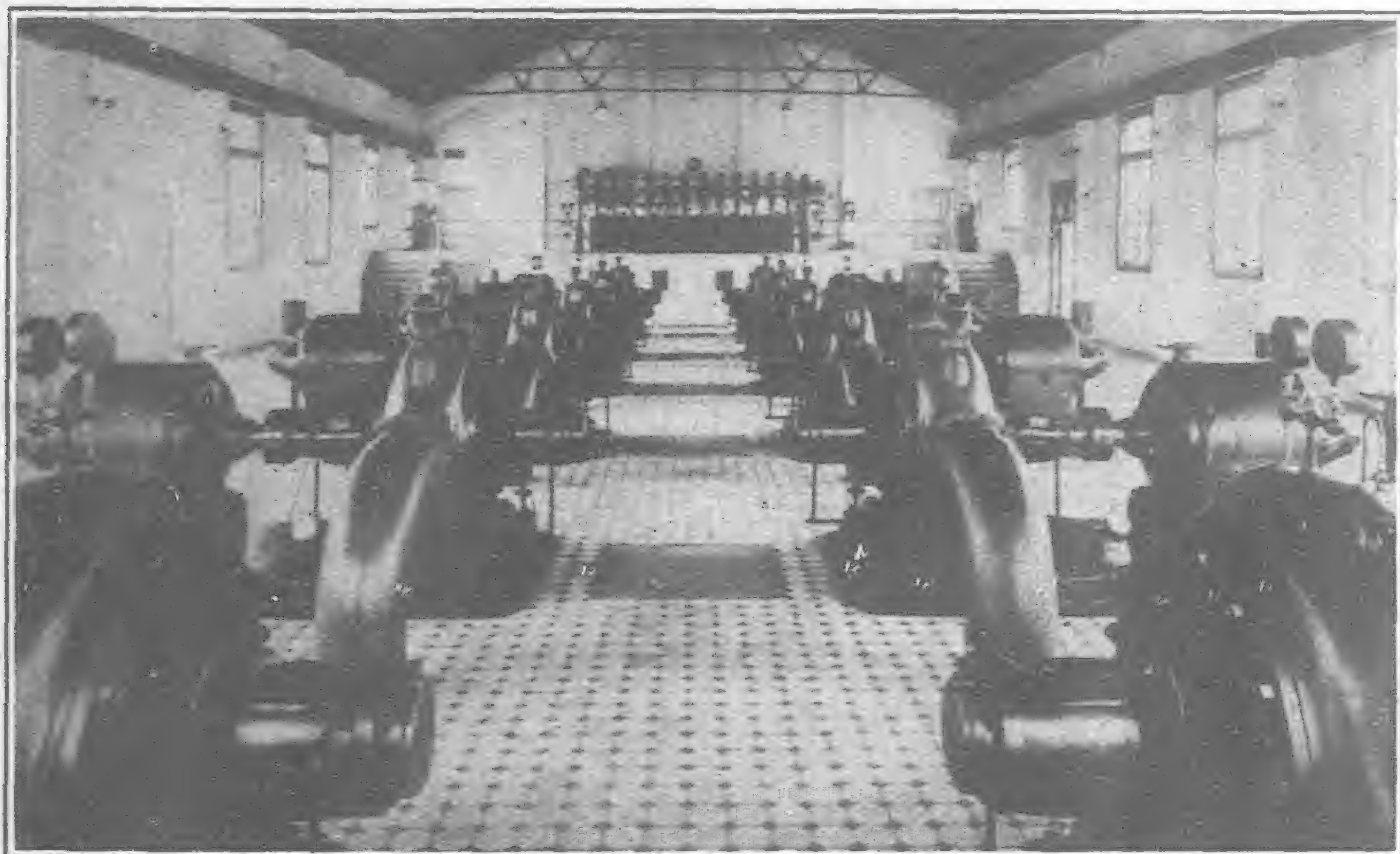
In proportion to the steady increase of the population of the city, the water consumption also increased, and therefore, the capacity of the water works was consequently gradually increased by a series of improvements. In 1904, three



THE OSAKA MUNICIPAL WATER WORKS AT KUNISHIMA

The Osaka Municipal water works at Kunishima in the suburbs of the city of Osaka has a capacity of supplying 83,370,000 gallons a day at present, but the capacity is being extended by 43,670,000 gallons to a total of 127,040,000 gallons a day, at the estimated cost of Y.8,000,000.

The picture shows a garden of the Kunishima works, underneath of which is the clean water reservoir. The picture also shows a section of the settling beds and the filter reservoirs.



INSIDE OF THE SERVICE PUMP HOUSE

Each one of the motor-pumps shown in this picture has a capacity of about 26,000 gallons a day.

filter beds were created; in 1907, one settling reservoir was added; 1908, four distribution pumps were installed, and intake pumps were replaced with new ones and two additional intake pumps were installed; in 1911 ten boilers were replaced with new ones, and four additional boilers were set up, and furthermore, new water main was laid.

The continuous extension of the water works resulted in the increase of its capacity to such an extent that it became able to supply a population of 800,000.

Keeping pace with the remarkable industrial and commercial development of the city of Osaka, the population went on rising steadily and rapidly, with the result that the water works had often to effect restrictions in its water supply, necessitated by the shortage of its capacity. With this in view, further extension of the water works was planned.

Second Phase of Extension

The Osaka Municipality, in August, 1907, obtained the approval of the City Assembly to establish an altogether new water works at Kunishima, in the suburbs of the city, and supply water by the pump-direct-distribution system; it was also decided then to install a meter in every water consuming house mainly with the object of preventing the wasteful use of water. The installation of meters was completed in March, 1910.

The construction of the new water works at Kunishima was commenced in January, 1908, and it was finished in March, 1914. The cost amounted to Y.10,467,500. The capacity of the Osaka Municipal Water Works, inclusive of the old and new plants, consequently, was increased to a total which was sufficient to keep a population of 1,500,000 supplied.

In consideration of the fact that the newly established water works alone can furnish the city with sufficient water, the city decided to give up the old plant at Sakura-no-miya.

Meanwhile, the European War broke out, bringing about the unprecedented industrial and commercial activity, and it stimulated the tremendous increase in the population of the city of Osaka. The water consumption, too, increased; so much so that there were indications already in 1917 that Osaka might again suffer from the shortage of water. It was suggested then to improve the old water works at Sakura-no-miya in order to use it again, but taking into consideration various points, it was found more convenient and advantageous to extend the

Kunishima works, the new one, than to make use of the old plant.

From June, 1918, until March, 1919, the Osaka Municipality introduced various improvements in the Kunishima works, including the adoption of the medical settlement system, installation of three additional motor pumps for water distribution, establishment of a station for power supply, installation receiving electric of additional electric transmission line and water intake tubes, and laying of an additional 26 inch water main connecting the Kunishima Works with the clean water reservoir at the Osaka castle, etc. The foregoing improvements were done with the investment of Y.399,300.

Third Phase of Extension

In consequence of the series of improvements, the capacity of the Kunishima water works was increased to about 1,350,000 *koku* or approximately 53,000,000 gallons a day, but the statistical survey indicated that the city of Osaka might again suffer from the shortage of water in about 1922. With this in view, the city authorities drafted a plan of extending the capacity, and also, laying a trunk water main to facilitate the water distribution in the city.

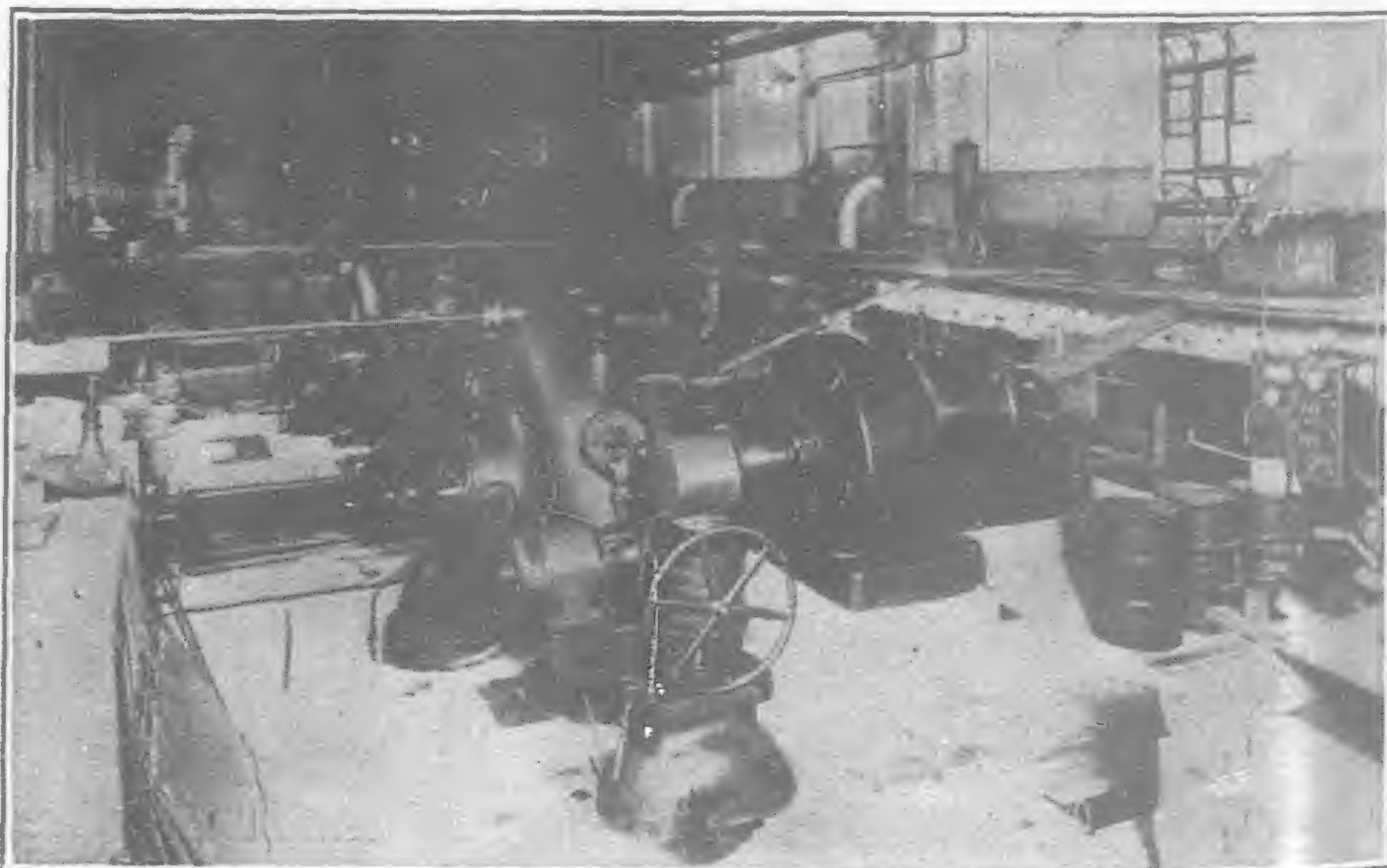
The plan was passed by the Osaka City Assembly in May, 1919, and the work was started in September of the same year. It was completed in March, 1922, one year earlier than it was expected to be finished. The investment during this period amounted to Y.10,403,966.

The main items in this improvement work were: creation of three settling reservoirs, 10 filter beds, two clean water reservoirs, installation of three intake pumps, 12 distribution pumps, and laying of 23 miles of water main. The capacity of the Kunishima water works, as the result of the foregoing extension, was increased to 83,370,000 gallons a day.

Present Capacity of Kunishima Works

The Kunishima Municipal Water Works is situated at Kunishima-machi, Higashi Yodogawa-ku, Osaka city, that is, on the right hand side of the River Yodo-gawa. The site extends to a little more than 125 acres.

Intake towers: the Kunishima works has two intake towers which stands within the river; the tower is a brick building, and it is oval-shaped. Each tower has three 48 inch tubes to take in water, and the water taken in here is led to grit chambers through

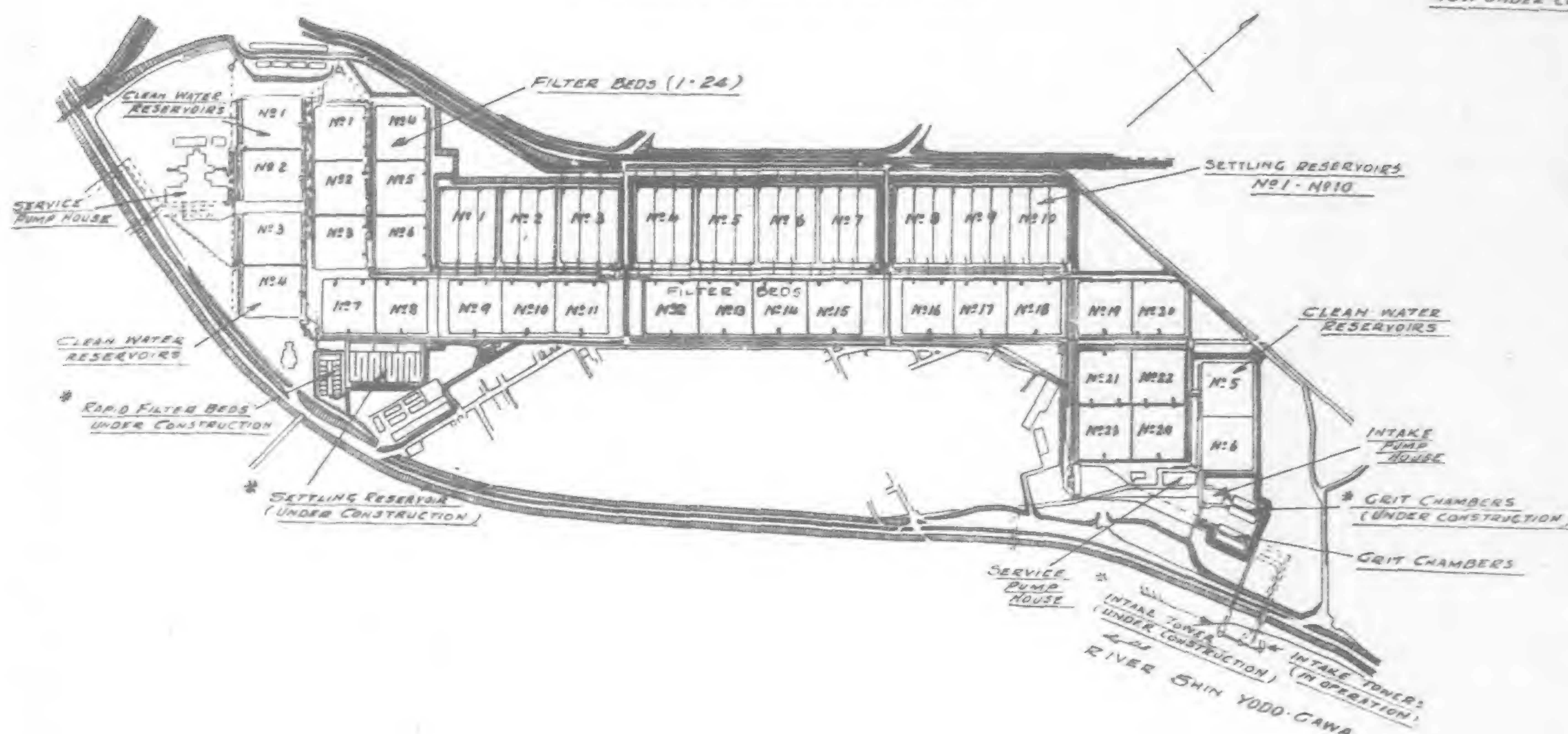


TURBINE PUMPS

In sequence of the present extension plan of the Kunishima water works, number of turbine pumps, capacity, approximately 1,200,000 gallons a day, were recently installed.

OSAKA MUNICIPAL WATER WORKS AT KUNISHIMA (PRESENT AND EXTENSION PLAN)

NOTE: * STANDS FOR THE
EXTENSION PROGRAM
NOW UNDER CONSTRUCTION



two 36 inch tubes ; that is, there are six 48 inch tubes and four 36 inch tubes in all.

Grit chambers : there are two reinforced-concrete grit chambers ; the size of the each grit chamber is 150 feet long, 36 feet wide, and 10 feet deep. Rough sand in the water led from the intake towers is sunk here, and then, the water is sent forward to the intake pump house through two 45 inch tubes.

Intake pump house : this is a reinforced-concrete building standing on a site of 129 tsubo ; the roof is iron-framed.

Intake pumps : there are nine centrifugal pumps directly connected with motors in the intake pump house. Of this total, six of them has a capacity of 1,250 cubic feet per minute, and the capacity of the remaining three of them is 1,700 cubic feet per minute, the total capacity being 12,600 cubic feet per minute. Each one of these pumps requires 150 h.p. of power. One of the 1,250 c.f. pumps and another of the 1,700 c.f. pumps are for reserve.

Operating these pumps, the water which is led from grit chambers to the intake pump house is sent forward to the settling reservoir through two 42 inch tubes (one of them is made of iron, the other wood) and two 45 inch tubes (one of them is made of iron, and the other, reinforced-concrete).

Settling reservoirs : there are 10 settling reservoirs, the size of each reservoir being 336 feet long, 258 feet wide, and effective depth, 9 feet.

Filter beds : there are 24 filter beds, the size of each bed being 240 feet by 240 feet. Of this total, four of them are for reserve purposes. Of the 24 filter beds, 14 of them are of reinforced concrete, and the surface of the side walls is covered with bricks. The remaining 10 beds, which are also of reinforced-concrete, has reinforced-concrete side walls.

The filtering speed is 12 feet per 24 hours, and at the outlet is fixed a controller in order to regulate the filtration. Generally speaking, one filter bed filters approximately 4,000,000 gallons of water a day. The water, which passed through the grit chambers and settling reservoirs, is made thoroughly clean here, and sent forward to the clean water reservoirs.

Clean water reservoirs : there are six clean water reservoirs. Of this total, four of them have a size of 276 feet long, 234 feet wide, and an effective depth of 10 feet. The total capacity of these four reservoirs is a little more than 14,000,000 gallons. Every one of these four reservoirs is made of concrete ; in the neighbourhood of the central entrance, there are eight partition walls, along which the water is made to flow constantly in order to prevent the decomposition which results from staying still.

The remaining two clean water reservoirs has a size of 240 feet long by 234 feet wide with an effective depth of 10 feet ; the total capacity is approximately 6,000,000 gallons. They also have 11 each of partition walls to keep the water moving along them.

All of these clean water reservoirs are covered with reinforced-concrete arched roof ; the roof is also thickly covered with earth. It is with the double objects of keeping the water clean, and also, of preventing the changes of the temperature of the water.

Service pump houses : there are two service pump houses. the one is the No. 1 service house which is of a brick, one-storied building, and the other, the No. 2 service house, is of a reinforced-concrete, one-storied building with basement.

Service pumps : there are two kinds of service pumps in use, and the one is those operated by steam, and the other is those electrically driven.

The steam driven service pump has a capacity of raising 937 cubic feet of water to a height of 160 feet per minute. They number nine in total, but seven of them are being daily used, the remainder of two being kept for reserve. Each one of these pumps is operated by about 400 h.p. of power.

The electrically driven centrifugal pumps has a capacity of raising 600 cubic feet of water to a height of 160 feet per minute. There are 12 of them in all, of which three are for reserve. They are directly connected with 300 h.p. motors.

The foregoing pumps are all for distributing water to the consumers, but in addition to the foregoing, there are three electrically driven pumps with a capacity of pumping 450 cubic feet of water to a height of 200 feet per minute, and they are used exclusively for the purpose of sending clean water to the clean water reservoirs in the Osaka castle. Usually, only two of them are operated, the remainder of the pump being for the reserve. They are operated by 280 h.p. motors.

Electrical equipment : The Kunishima water works requires 3,000 k.w., which it receives from the electric bureau of the Osaka Municipality and from the Ujigawa Electric Power Company at 11,000, volts, which is transformed into various pressures, and operate the intake pumps, service pumps, and other motors, and also furnish the water works with electric lights.

There are two transformer stations : they are :

The No. 2 station has four single phase transformers for 750 k.v.a., of which one of them is for reserve ; it also has four single phase transformers for 500 k.v.a., and three single phase transformers for 25 k.v.a.

The No. 1 station has four single phase transformers for 250 k.v.a., and six single phase transformers for 25 k.v.a., in addition to the equipment for switching on and off from the hydro-electric power to steam electric power.

Power plant : the Kunishima water works has steam power plant which may be put into operation in the event of both the Kujo power plant of the Osaka Municipality and the Ujigawa Electric Power Company happen to be unable to furnish the water works with the necessary electric power.

This power plant has a capacity of generating 825 k.v.a., operating three main 265 h.p. generators, two 100 h.p. auxiliary generators, etc.

The present site of the power plant building has a surplus space for installation of another main generator.

Boilers: The Kunishima water works has 16 boilers with stokers attached, and the registered capacity of each one of these boilers is 287 h.p. In addition, there are four sets of coal economizers and four blowers and one coal conveyer. With exception of the conveyer, one half the number of these apparatus are in daily use.

Water Main: there are four trunk water mains, i.e., east, north, west, and central.

The eastern water main has a diameter of 42 inches, and the northern water main, 39 inches. It is through these water mains that the eastern and northern parts of the city of Osaka is supplied with water. They run out in parallel from the second service pump house and cross the River Shin Yodo-gawa, and go to Roku-chome, Tenjinbashi, Kitaku, Osaka, from where they run in different directions, meeting, in the end, with the old water mains. The diameter of the mains gradually becomes smaller and smaller as they run farther, until it becomes 20 inches.

The western and central water mains have diameter of 42 and 39 inches, respectively, when they run out from the No. 1 service pump house in parallel and cross the River Shin Yodo-gawa to Honjo-machi from where they run in different directions. Their diameter also becomes smaller as they run farther.

Fourth Phase of Extension

(Present Extension Work)

As it is given in the opening part of this article, the Osaka Municipality is extending the Municipal water works at Kunishima from the present maximum capacity of 83,370,000 gallons a day by approximately 43,670,000 gallons to a total of approximately 127,040,000 gallons, at an estimated cost of Y.8,000,000.

Statistics of past years indicate that the maximum consumption of water per hour and that per diem tend to increase year after year. Based on this increasing percentage, it is figured out that the daily water consumption per day per capita in 1936 will reach about 34.7 gallons, and the maximum consumption, 46 gallons.

Extension Program

One of the main enterprises which is to meet the increased requirement of water consumption is to increase the filtration speed of the present establishments. In sequence of this program, a new intake tower is under construction in line with the present intake towers at a point 100 feet lower stream of the Shin Yodo-gawa.

In north of the present grit chambers, two more of them of lozenge pattern are under construction; the size of each of them is 130 feet long by 20 feet wide at the both ends and 40 feet wide at the centre, with an effective depth of 13 feet.

Four more electrically driven centrifugal pumps are being installed in the intake pump house, of which one of them is for the reserve purposes; the capacity of two of them is 36.7 cubic feet per second, and that of the remaining two is 48 cubic feet per second.

The new intake tower will be connected with the new grit chambers with two 48 inch water mains, and the new grit chambers will be connected with the intake pump house with two 48 inch water mains. The intake pump house will have two more water mains, the diameter of which is 48 inches and 45 inches; the larger one is led to old filter beds and the smaller one is to be led to the proposed rapid filtration bed.

The present filtration speed of the existing filter beds is 12 feet a day, which is going to be increased to 16 feet a day. As the result of the careful study for one year since September, 1923, it was found that the quality of water undergoes no changes when the filtration speed is quickened from 12 feet to 16 feet a day, but it found necessary to enlarge and prolong the present sluice conduit and also to have a special medical arrangement to deal with the times when the water is muddy or when the water implies a great deal of bacteria. The water level is going to be raised by

about one foot, but there is no need of making the side walls any higher.

At present, there are 24 filter beds of which 20 of them are being used. Each filter bed has a size of 240 feet by 240 feet and its capacity is approximately 4,200,000 gallons a day, and therefore, with 20 filter beds, they can easily dispose of 83,370,000 gallons (the estimated maximum total) of water a day. But, when the filtration speed be increased from 12 feet to 16 feet, the capacity of each bed increases to 5,697,700 gallons a day, and therefore, with 19 filter beds, approximately 106,000,000 gallons of filtered water may be had a day.

Rapid Filter System

The one striking feature of the present extension work of the Kunishima Municipal water works in the proposed construction of the rapid filter system, within the present premises of the water works, at the south-easterly corner, with the object of obtaining approximately 21,041,000 gallons of water a day. The main items of the construction work are the arrangement for automatic pouring of sulphuric alumina into the original water, the mixing chamber, the settling reservoirs, and filter beds, etc., which will occupy a site extending to a little more than three acres.

Sulphuric alumina arrangement: in accordance with the mudiness of the original water taken in at the intake house, a certain proportion of sulphuric alumina is going to be mixed into the water automatically before the water enters the settling reservoirs.

The water which arrives at the intake pump house is sent forward to a measurement well, which is 40 feet long by 10 feet wide, with an effective depth of 8 feet; it is reinforced-concrete well.

At the lower part of the central partition, there is a hole, and the quantity of the water within the well is measured by the difference of the water level on both sides of the partition.

In the upper part of the well, there are going to be built two pails within which the sulphuric alumina is going to be melted into water; the pails will have mixers, and also a special apparatus by operation of which the quantity of the melted sulphuric alumina water may be regulated.

Mixing chambers: three of these chambers are going to be built in line. Each one of them has a size of 5 feet long with a width of 37 feet wide. The duty of these chamber, which may be used separately or all in succession in accordance with the mudiness of the original water, is to make the water thoroughly mixed with medicine. Each one of them has 10 partition walls forming circuit water way extending to 3,550 feet in the aggregate total.

The water flows along these partition walls at the speed of 1.7 feet per second, taking about 35 minutes before the water flows from the beginning to the end of the partition walls.

Settling Reservoirs: there are going to be four settling reservoirs, the size of the each of them being 100 feet long by 80 feet wide with an effective depth of 14 feet. Each one of the reservoirs has two partition walls, with which a circuit water way extending to 330 feet in the aggregate total is formed. The speed of flowing water here is 1.6 feet per second or 3.5 hours before the water covers the entire length of the circuit water way.

Filter beds: fourteen filter beds are going to be built, and 12 of them will be used, the remainder of two being reserves. Each one of the beds will have a size of 36 feet long by 21 feet wide a depth of nearly 10 feet. They run in a row, two abreast. Between the line, there will be a underground path with a width of 24 feet, extending to 156 feet, with the object of examining the water and operating various apparatus.

The filtering speed is approximately 400 feet a day. At the entrance and the outlet of the each filter bed are fixed the regulators by means of which the filtering speed is fixed at a certain standard, and the quantity of the filtered water is regulated.

Mechanical equipment: an engine room is going to be built beside the filter beds. It will have two centrifugal pumps and three centrifugal air compressors which will be operated in cleansing the filter beds.

Chlorination: the quantity of the water of the River Shin Yodo-gawa shows a tendency to become inferior. In consideration of this fact, and also, in preparation for the increase of bacteria as a result of rain fall or some other causes, an arrangement for chlorination will be established between the filter beds and the clean water reservoir, at three places.

The Buying Power of China's Masses

By Charles K. Moser

OF China's immense population at least 80 per cent. is agricultural. The social and economic life of the nation is so definitely associated with agriculture that, the Chinese themselves say, all the inroads of modernism and the industrialization of the larger cities have made hardly an impress upon the general condition of the people. General Chiang Kai-shek, the leader of the Nationalist forces, told his fellow provincials of the Ningpo Guild in a recent speech that: "Out of the 400,000,000 Chinese, 360,000,000 are farmers and laborers. The rest are merchants and students."

In recent years, nevertheless, the search for new sales territories has turned the eyes of the industrial west more and more toward China, as offering the greatest potential market in the world for the products of the factory. The lure is that of sheer vastness of numbers—400,000,000 people, all with human needs, mostly unsatisfied.

Buying Power of Masses an Elusive Factor

One prime factor, of fundamental value in any estimate of China as a potential market, has ever eluded the investigator—that of the purchasing capacity of the masses. So many mouths to feed, so many bodies to clothe, so many hands to fill with tools; but how much to buy with? Statistics have been wholly wanting. Estimates too often have been based upon the thriving populations adjacent to the Treaty Ports, or mere guesses at conditions in the remote interior. There has been no standard by which to measure, or even approximate, the wealth, and therefore the buying capacity of China's farmers, who constitute in such tremendous majority the bulk of the potential market. All that has been definitely known is that they were at the extremity of poverty, but were frugal and industrious.

Survey Throws Light on China's Farm Life

A recent survey of 150 farms, conducted by Nanking University and reported by Assistant Commercial Attache A. H. Evans, Peking, however, serves to throw a good deal of light upon hitherto a very obscure subject. The 150 farms were located in one of the most prosperous regions of Central China, and while it is realized that

the area surveyed comprises but a very small part of China's agricultural total—with conditions in North and West China undoubtedly differing in some details—the findings probably afford a fair basis for generalizations upon the whole of China's farm life.



Human Labor is still the Chief Source of Power

Land Values Comparatively High—Improvement Costs Low

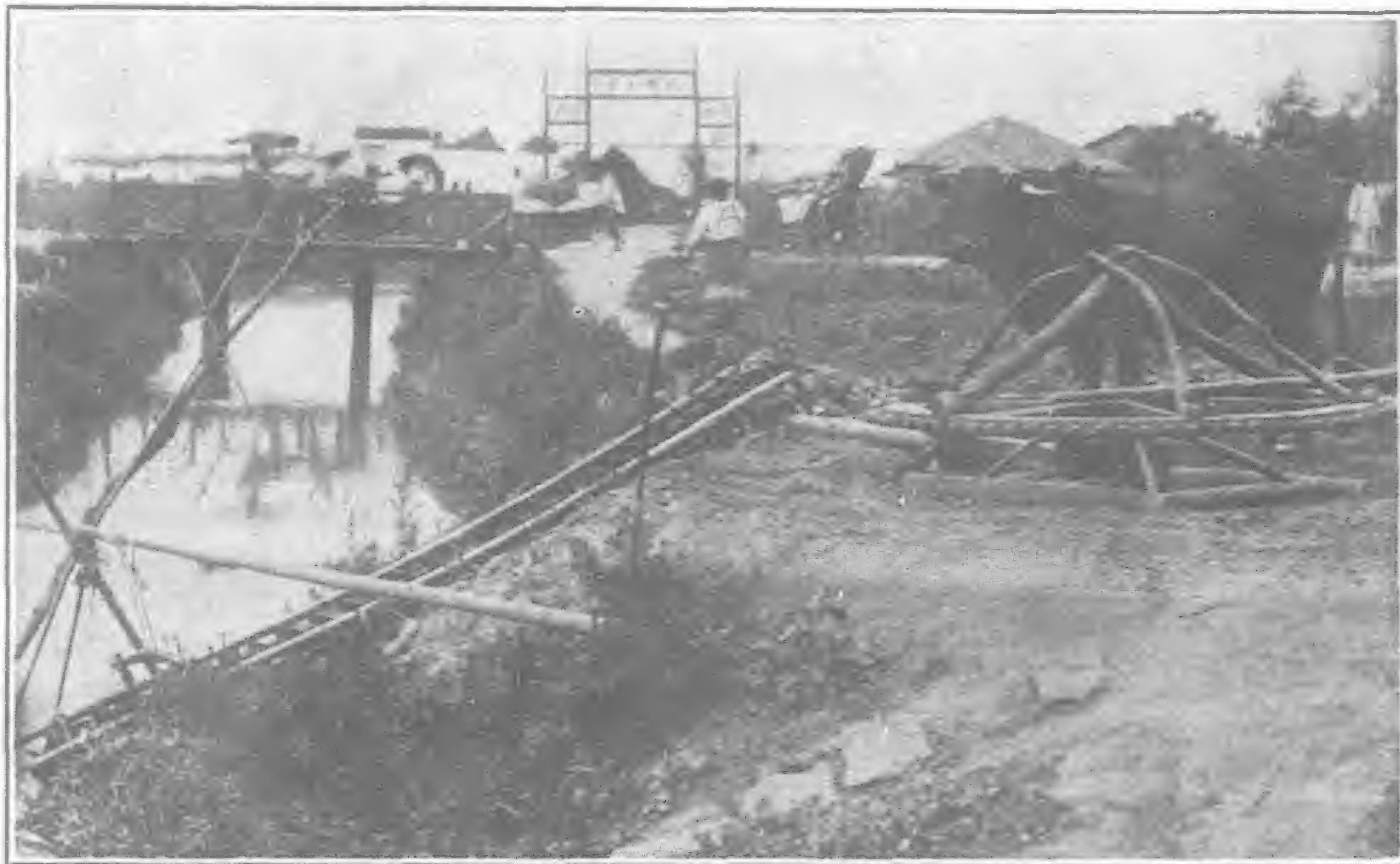
The surveyors covered a full year's operation of the farms studied and went at their task scientifically. The questions asked the farmer were in his own terms of thinking and pertained to every detail of his business. The smallest farm in the survey contained 0.6 acre, or a little more than half an acre, and the largest 34.1 acres. The average size of the farms surveyed was 4.9 acres, while the ratio of crop area to total acreage was 93.2 per cent. The capital investment per farm averaged 762 silver dollars (1 silver dollar approximately \$0.50), and the average value of the land per acre approximated 108.44 silver dollars. The average investment in live-stock per farm, 35 dollars, corresponded to about \$17.50 in United States currency.

The inference to be gathered from these figures would appear to be that land values are comparatively high, and the cost of labor and materials for farm-houses and other improvements low. At 108.44 silver dollars per acre, the land investment on the average farm would amount to 531 dollars, leaving but 231 dollars invested in farm buildings, live-stock, and equipment. Farm build-

ings in China are oftenest made of mud bricks, mixed with straw or bamboo stalks. Foodstuffs are stored in granaries built of brick, or in bins made of bamboo mats held together by wooden stays. The low investment in live-stock is evidence of the poor quality of Chinese farm stock, for every farmer keeps poultry and hogs besides such draft and pack animals as the water buffalo, donkeys, oxen or horses.

Farm Implements Primitive

Farm implements, the survey found, were of the most primitive, both in construction and material. It may interest the American agricultural implement manufacturer to know that the usual farm equipment consisted of a wooden fork; a hoe; sickle; tool for picking up manure; a shovel for winnowing grass; bamboo broom for use on the threshing floor; double-rowed spike-tooth harrow; wooden rake; wooden shovel; drill, which sows two rows at a time;



As Their Forefathers did



In this Economy Child Labor is Inevitable

rattan basket; shovel cultivator; plow, with an iron beam and one wooden handle; stone roller for packing soil; and large knife for cutting fodder—and that the total value of tools and equipment per farm averaged 17.63 silver dollars (\$8.82).

A touch of the naivete that so characterizes the Chinese peasant is here brought out in the report of the survey: The investment in implements and equipment per crop area was found to be nearly twice as much on the larger farms as on the smaller ones, because the small farm owners made a practice of borrowing tools from the larger farms. In Hunan the farmers borrow or hire animals for field work, usually oxen, from each other, and it is not uncommon to find joint ownership of one animal between two or more farmers.

Average Farm Income and Expenditure

A summary of the year's business on the 150 farms surveyed revealed the average annual income and expenditure per farm as follows:

Farm receipts:						Silver dollars
Crop sales	...	...	...	...	...	81.50
Animal products sold	...	...	...	...	...	4.06
Other cash receipts	...	...	...	...	...	2.12
Products from the farm used by the family	...	...	...	...	...	70.15
Increase of capital	...	...	...	...	...	9.97
Total	...	...	...	...	...	167.80
Farm expenses:						
Hired labor (including board)	...	...	...	...	...	5.34
Value of family labor (unpaid)	...	...	...	...	...	19.14
Cash expenditures (other than hired labor)	...	...	...	...	...	41.19
Decrease of capital	...	...	...	...	...	1.47
Total	...	...	...	...	...	67.14

From these compilations the following interesting figures are adduced by the surveyors:

	Silver dollars
Farm earnings (farm receipts minus farm expenses)...	100.66
Interest on capital (\$762.38 at 8 per cent.) ...	60.99
Labor earnings (farm earnings minus interest on capital) ...	39.67

Silver dollars

Labor income (labor earnings minus value of farm products used by the family) ...	30.48
Income from other than farm sources ...	15.33
Family income (crop sales plus animal products sold plus other cash receipts plus income from other than farm sources minus cost of hired labor plus other cash expenditures) ...	56.48
Family earnings (farm receipts plus income from other sources minus all farm expenses except value of family labor) ...	135.13
Per cent return on capital invested (farm earnings minus value of operator's labor divided by average capital) ...	9.80

The total annual return to the Chinese agricultural family, averaging, the survey found, 5.35 persons, from its land and labor thus comes to scarcely 100 silver dollars. After deducting the interest on its invested capital, the family has just under 40 silver dollars, less than \$4 gold per person, with which to meet all its needs not provided by the farm itself. Foreign-style foods, clothing, household equipment, implements of trade, social entertainment, and personal adornment all must come out of this less than \$4 per year, say a cent a day.

One has here the reason why advertising campaigns for the sale of western appliances and delicacies in China are largely confined to the populations in or adjacent to the Treaty Ports, why efforts to introduce to the Chinese masses American notions having a vast popular appeal in the United States have generally failed. Here is the reason also why, despite admirable efforts to meet the great need in China for improved farm machinery and agricultural implements, so few modern devices are seen in Chinese fields. For the present at least the foreign manufacturer will perhaps be well advised if he limits his efforts at trade expansion, in the main, to the 40,000,000—itsself an optimistic estimate—of China's numbers whom Chiang Kai-shek classified as "merchants and students."

Financing Japanese Railway Development

THE problem of Japanese railway improvement and expansion during the budget year beginning April 1, 1927, has been a difficult one, in view of the unsatisfactory state of the public finances and the retrenchment policy of the present Government. It has been complicated by an unexpected falling off in receipts for 1926 up to December; freight income for the month of November, 1926, represents a decrease of Y.209,213 from last year's returns (Y.17,245,336). As the present business depression seems likely to continue indefinitely, the original estimate of Y.174,826,000 for the year beginning April 1, 1927, has been reduced by Y.16,000,000. Although freight loadings for November amounted to 6,302,000 tons, or 1½ per cent., over last year, revenues declined 1.2 per cent., and both loadings and revenues are beneath the November average. Loadings had been estimated at 2½ per cent. in excess of the tonnage actually carried.

There was lively disagreement in 1926 over the railway estimates, which was compromised by the proposed authorization of a Y.59,000,000 bond issue, of which Y.3,000,000 must be liquidated from current revenues during the year. The estimated expenditure for the next three budget years is shown in the following table:

Japanese railway budgets as approved by the diet for coming years.

		Original	Approved
Budget year (beginning Apr. 1) estimates			estimates
1927-28	.. ..	Yen 174,836,000	158,826,000
1928-29	.. ..	„ 186,826,000	170,826,000
1929-30	.. ..	„ 198,826,000	182,826,000

Daido Denryoku K.K. Adds to System

By S. Q. Hayes

THE Daido Electric Power Company is one of the most important power transmission companies in Japan, and they supply power at 154 kv., 60 cycles for transmission to Osaka, 77 kv., 60 cycles to Nagoya and 154 kv., 50 cycles is fed into the system of the Tokyo Electric Light Company.

The most of the power developments of the Daido Power Company are along the Kiso River, the principal stations being Ohi with four 13,750 kva. generators; Yomikaki with three 17,000; Okuwa with three 5,000; Suhara with two 5,500, and Momoyama with two 15,000. Other hydroelectric developments tie into the same system and at Nagoya and Osaka are large reserve steam stations.

The bulk of the power developed by the Daido Power Company is delivered to the Furukawabashi receiving station over two 154 kv. transmission lines, the voltage at Furukawabashi being maintained constant at approximately 140 kv.

The original equipment for the Furukawabashi station included six 28,200 kva. transformer banks, each comprising three 9,400 kva. units, stepping down from 140 kv. Star to 55 kv. Star and to 11 kv. Delta. Originally there were twelve 55 kv. outgoing feeders, two to Amagasaki, two to Keihan, two to Kema, four to Daiden and two to Kyoto. Two additional circuits to Wakayama have since been installed.

The 11 kv. tertiary circuits in each of the six transformer banks supplied power to a 15,000 kva. 3 phase, 60 cycle synchronous condenser.

Essentially all of the equipment of this Furukawabashi Station with the exception of three of the 15,000 kva condensers was supplied by the Westinghouse Company.

Additional transmission circuits have been proposed for delivering power to Furukawabashi from new developments from the Daido Power Company, and it was decided to install at Furukawabashi additional transformer and condenser capacity for these new circuits and for the supply of the 77 kv. system between Osaka and Nagoya.

For this purpose, the Westinghouse Company recently supplied to the Daido Power Company, the three 20,000 kva. single-phase, oil-insulated, water-cooled transformers shown in Fig. 1, these being connected in Star for 140 kv. service with a bank capacity of 60,000 kva. The transformers have their secondaries also connected in Star for 77 kv. service and their tertiaries, each with a capacity of 10,000 kva., are connected in Delta forming a 30,000 kva., 11 kv. source of supply for a synchronous condenser of the same rating.

The 11 kv. circuits are provided with 3,300 volt taps that may be utilized at some later date to obtain a-c. starting of the synchronous condenser or may be utilized to furnish power to a 3,000 horse-power operating motor.

To facilitate handling the 20,000 kva. transformers, their tanks were made in two sections bolted together with the connections for the six circuits of the water-cooling coils brought out through the side of the upper portion of the tank.

As the original equipment of 18—9,400 kva. transformers was of the conservator tank type, this same type of case was utilized with the three 20,000 kva. units.

Fig. 2 is a view of the 30,000 kva., 11 kv., 600 rpm., 60 cycle, three phase synchronous condenser, this condenser being specially designed to operate from 30,000 kva., lagging to 30,000 kva., leading.

The condenser is provided with a direct coupled exciter, the flange on the exciter shaft being bolted directly to the end of the condenser shaft so that the complete exciter can be readily removed in case it is desired to dismantle the main units.

Although the synchronous condenser is provided with a damper winding making it suitable for a-c. self-starting, it is also equipped with a driving motor at the other end of the shaft from the exciter. This driving motor having a nominal rating of 3,000 horse-power, is utilized for starting purposes and is also used to drive the synchronous condenser as a generator when it is desired to test out a transmission line from the Furukawabashi end.

To assure the automatic control of the power factor of the 30,000 kva., synchronous condenser in order to maintain proper voltage on the 77 kv. bus, an extended broad range regulator was employed, this regulator being of the face plate construction.

The furnishing of the new 60,000 kva. transformer bank and 30,000 kva. condenser, increases the capacity of the main units in this station to 228,200 kva. in Westinghouse outdoor, water-cooled transformers, and 120,000 kva. in 60 cycle condensers of which 75,000 kva. are of Westinghouse make.

Two incoming lines of the Furukawabashi station, operating at 140 kv., connect to a sectioned ring bus provided with oil circuit breakers and disconnecting switches so arranged as to facilitate operating half of the system from each line independently, or both lines in parallel supplying the entire system.

There are six 28,200 kva. transformer banks, three winding 140 kv., 55 kv. and 11 kv. and one 60,000 kva. transformer bank, three winding 140 kv., 77 kv. and 11 kv.

(Continued on page 305).

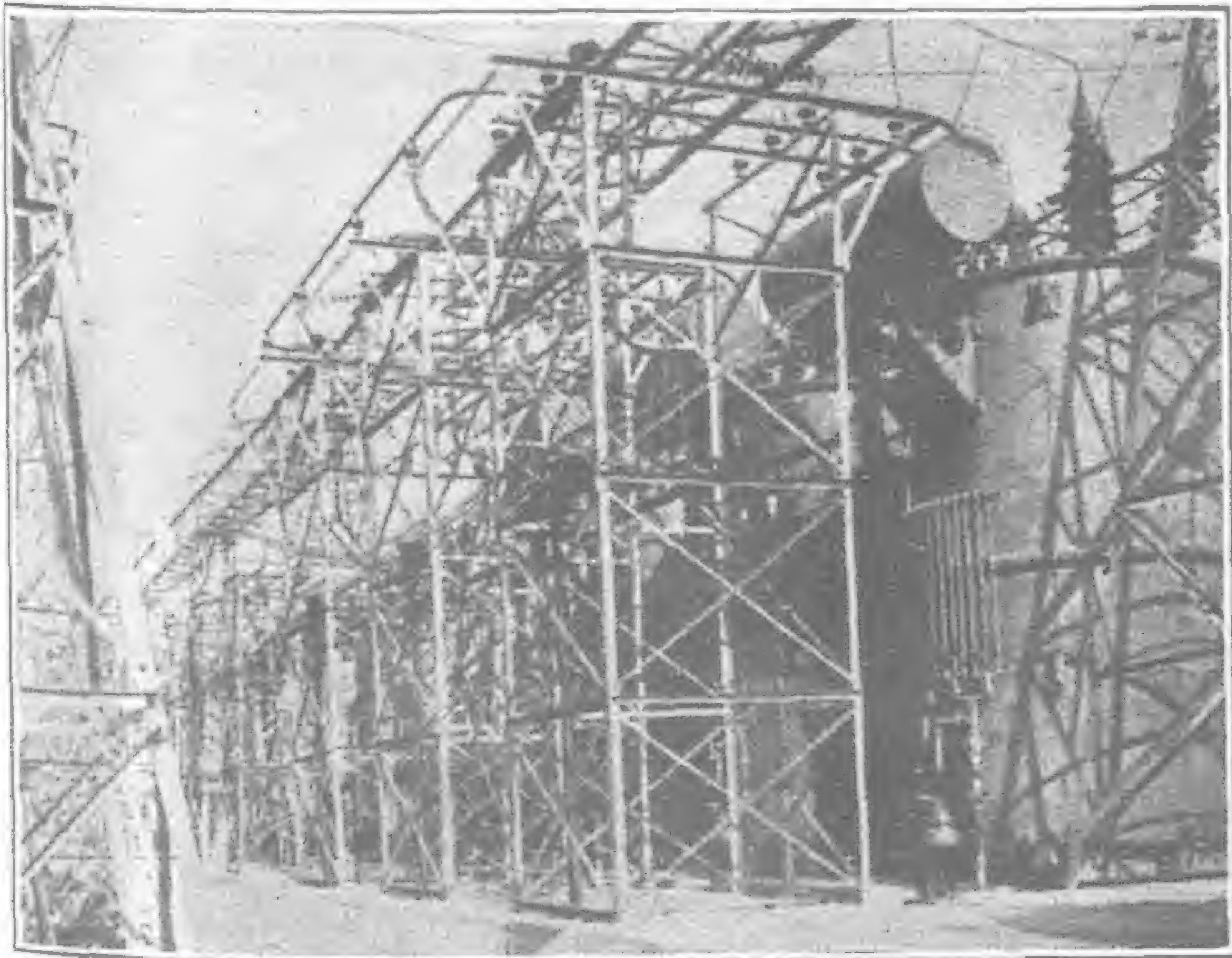


Fig. 1.—O.I.W.C. Westinghouse Transformers 20,000 kva., 154 kv., for Furukawabashi Sub-station Daido Denryoku K.K.



Fig. 2.—Westinghouse 30,000 kv-a., 11,000 volt, 600 rpm., 60 cycle, 3 phase Synchronous Condenser for Furukawabashi Sub-station Daido Denryoku K.K.

Industrial Manchuria*

By Henry W. Kinney

UNTIL a few decades ago, Manchuria was industrially in a very primitive state. It has become important partly through introduction of modern machinery and methods for handling products which had in the past been manufactured by very crude and wasteful process, and partly by the establishment of numerous new industries by which use is now being made of raw materials which formerly were not used at all.

In this work the South Manchuria Railway has taken an outstanding part by the establishment of various research and experimental institutions, such as the Central Laboratory and Geological Institute in Dairen and others. Numerous scientists in its employ have combed Manchuria in search of materials which might be manufactured profitably, and have developed manufacturing processes. In many cases the Company has been the pioneer in establishing factories in which new industries have been given a start; then turning such over to private enterprise as soon as they were able to stand on their own feet, and in this way an example has been set and an impetus given to many of the new industries of Manchuria by which many thousands are employed, thus adding materially to the prosperity of the population and the country generally.

Even the crude native bean oil mill is rather new in Manchuria, the first having been established about seventy years ago. The first steam plant was introduced by an Englishman in Newchwang in 1896, but the actual establishment of bean oil milling on a large scale followed the advent of the Japanese, and subsequently numerous improvements have been made in manufacturing methods which have contributed largely to the growth of the industry. Dairen, where not a single bean mill of any kind existed in the Russian days, is now the center of this industry, though modern mills are also found elsewhere, and many hundreds of fairly primitive native mills scattered throughout Manchuria manage to operate very profitably.

Flour milling is mainly an industry of North Manchuria, where the principal wheat crops are found, but such mills are also operating in South Manchuria. This industry has seen great fluctuations, owing mainly to commercial conditions in the outside world, but as the native population of Asia is turning to wheat as a food stuff in increasing degree, the flour industry offers considerable promise.

The part which the South Manchuria Railway, through the Central Laboratory and other agencies, has taken in the development of new industries, is interesting. The Central Laboratory not only renders assistance to private enterprise by furnishing analytical

tests, estimates and the like, but it is constantly conducting investigations into various fields of research. An idea of the scope of its activities may be gained from the following eight divisions which it contains, namely, Analytical Chemistry, Applied Chemistry, Textile and Dyeing, Pottery, Fermentation, Sanitary Chemistry, Electrical Chemistry, and Detail, in addition to which it establishes experimental work-shops wherever it seems possible to develop any enterprise on a sound commercial basis.

Bean Industry

Among its activities have been the founding of a bean mill employing the chemical extraction system, and the numerous new uses of the bean, which have been enumerated already, have been due mainly to the researches of this Laboratory. In 1910, an earthenware and porcelain factory was established, which was later on turned over to private enterprise. This brought an entirely new industry to Manchuria which had in the past imported all its pottery, although abundant and excellent raw material is found at various points within its boundaries. Manufacture of fire brick and bricks of various other kinds has also been developed, as well as that of glass of various kinds, which has been extremely successful, especially as raw material of a high order is found near Dairen.

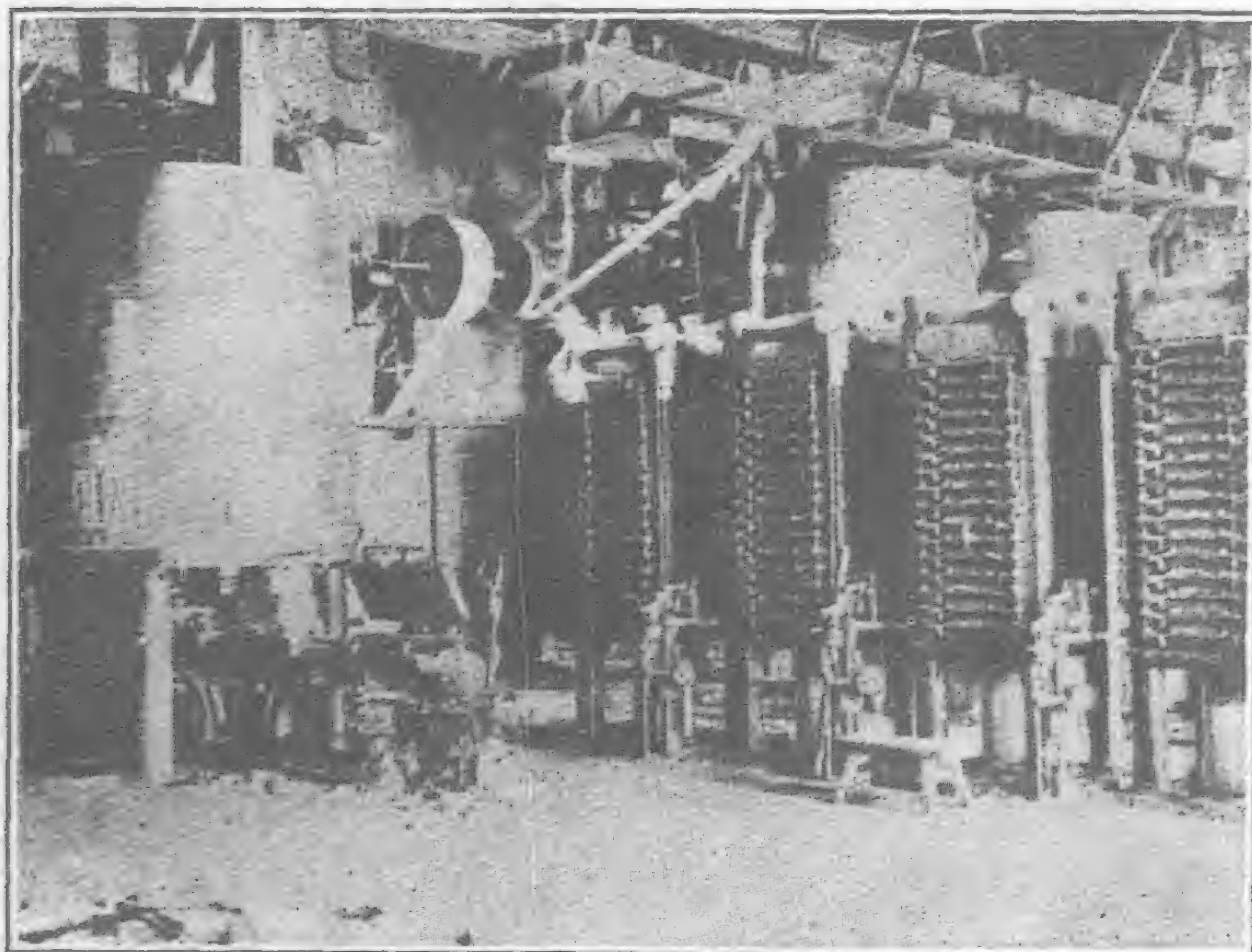
The numerous valuable industrial minerals which are found in quantity and variety in Manchuria, have been studied and various products manufactured therefrom, and similar work has been done whereby various new uses have been found for agricultural products while several improvements in the method of handling the wild silk industry, which is of considerable importance, have been effected and imparted to the Chinese.

It follows that Manchuria has benefited enormously by these activities which have given value to many heretofore unused raw materials and have increased that of those which were formerly produced wastefully and crudely by means of primitive methods. Numerous manufacturing enterprises have been developed, such as sugar manufacture, spinning mills, etc., in which Chinese, Japanese, and foreigners engage, and employment has been furnished to many thousands, all of which has, of course, added enormously to the material wealth of the country.

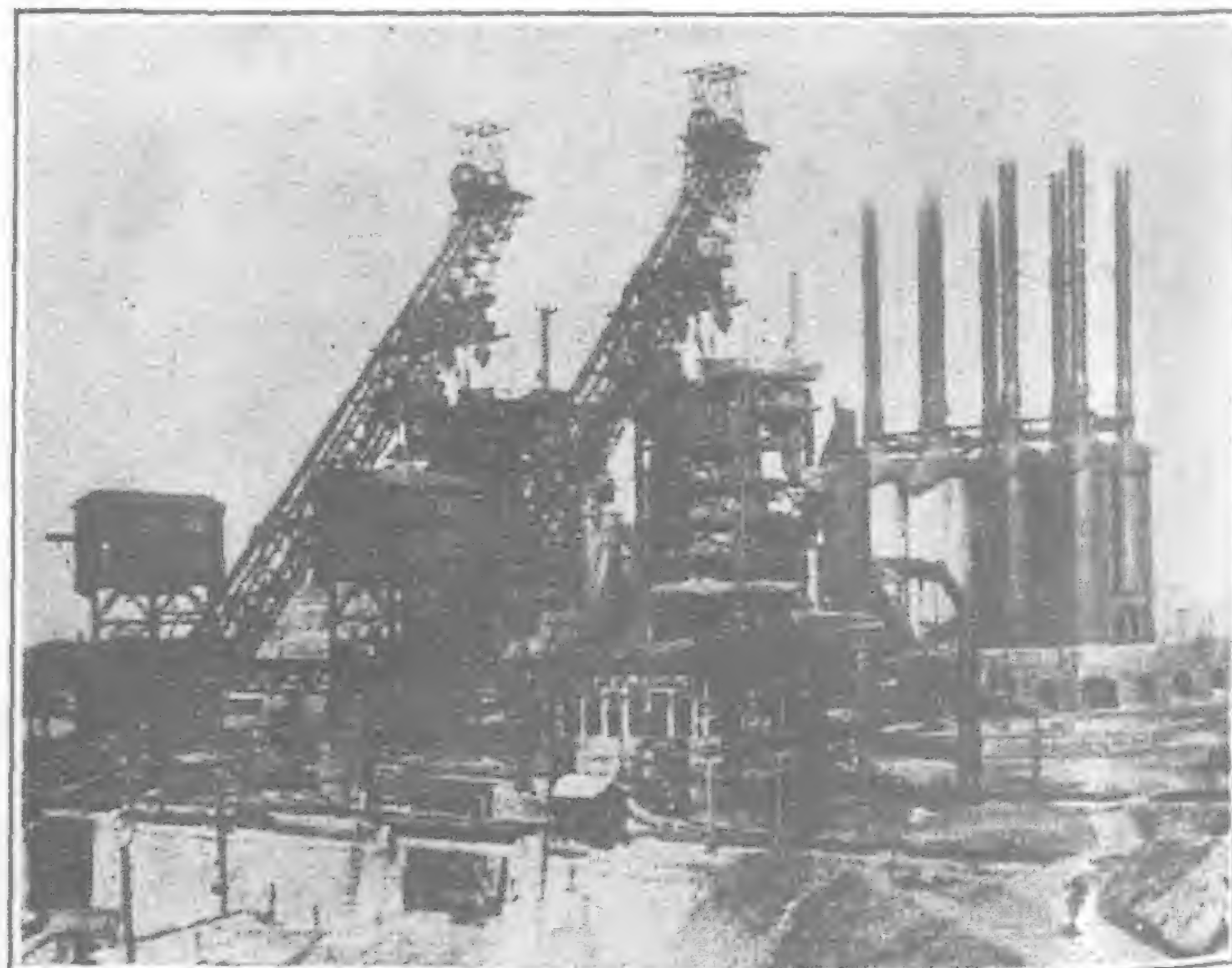
Fushan Mines

The Fushun coal mines, which form one of the principal assets of the South Manchuria Railway Company, are located about

**The Oriental Engineer, May 1927*



Oil Compressor, Dairen



Anshan Steel Works Operated by the South Manchuria Railway Company

twenty miles east of Mukden and are connected by rail with the main line. This coal field, which was acquired in 1907, covers some 16,500 acres, nearly ten miles from east to west and $2\frac{1}{2}$ miles from north to south, with veins ranging in thickness from 78 to 420 feet, the average being 130 feet. The impurities do not exceed 20 feet in total thickness, and the total coal content is estimated at over a billion tons, of which up to the present 50,000,000 tons have been mined.

Open Cut Mining

These deposits were originally discovered some 700 years ago by Koreans who worked them in a very primitive way, but later the Manchuria government forbade further operations as they feared they might interfere with the spirits of departed imperial ancestors whose graves were in the vicinity. When the Russians entered Manchuria they took up mining here, but the scale was so limited that the daily output was only 360 tons. Under Japanese management extensive improvements have been made and numerous modern methods introduced, about Y.51,000,000 having been invested in this connection. A number of pits have been sunk and the spectacular "open cut" opened whence huge amounts of coal are stripped, which has increased production to the point where the output in 1926 was 5,737,306 tons, which will be increased, by 1932, to 8,000,000 tons annually; which will constitute the practicable maximum. It is thus expected that mining can be continued for another 85 years. It is estimated that about 200,000,000 tons may be taken out by the stripping methods by which the recovery is about 100 per cent., while the remaining 750,000,000 tons must be taken out by the hydraulic stowage system through which from 60 per cent. to 70 per cent. may be recovered.

Fushan coal is bituminous, of high quality, and suitable for locomotive and marine engines, being also excellent for gas making. A Mond gas producer plant has been established which generates electric power and also produces a large quantity of sulphate of ammonia as a by-product, and coke ovens are also maintained. The coal is being used on the South Manchuria Railway, and large quantities are exported, while the growing demand for coal as a fuel by the inhabitants of Manchuria accounts for a large consumption locally.

Oil Distillation

An important industry which is being developed in connection with the Fushan mines, is the distillation of oil from the shale deposits which are estimated to amount to about 5,500,000,000 tons, and as this shale must be taken out in connection with the coal mining operations this raw material is virtually costless. After various experiments with systems used abroad, the Fushan experts invented a new process which recent experiments have shown to be highly successful. Plans have been made for a plant capable of handling 700,000 tons of shale a year, from which it is expected will be produced 50,000 tons of heavy oil, and 1,000,000 gallons of volatile oil, as well as paraffin and ammonia.

The Yentai coal mine, about ten miles northeast of Yentai station, with which it is connected by rail, is about $3\frac{1}{2}$ miles long by one mile in width, with an estimated deposit of 20,000,000 tons. This colliery began operations in 1910, and its output in 1926 was 138,248 tons.

These coal mines form one of the most important sources of revenue for the South Manchuria Railway, as may be seen from the fact that in 1926 the total revenue was Y.68,447,274 against an expenditure of Y.59,418,780.

With the development of the Fushan mines, a large and modern town was built, but as it was discovered that it had been located over a valuable coal seam, which is to be exploited by the open cut system, it became necessary to move it and the work of rebuilding the town on a new site is now in course of progress.

Anshan Iron Works

In 1909 officials of the South Manchuria Railway Geological Institute discovered the presence of iron deposits at and about Anshan, and about six years later development thereof was made possible through a treaty with China. A site of about 4,540 acres was purchased for the plant and the modern town which has been built there. While the ore reserve is large, being estimated at about 300,000,000 tons, most of the ore is of rather poor grade, averaging from 35 to 40 per cent. of metal to the ton. The richer grades,

averaging some 52 per cent., are scattered in small deposits, most of which have already been worked.

The first pig iron was produced in the spring of 1919, but as the price of iron which had been abnormally high during the war years, soon fell considerably, the high hopes originally entertained were to some extent disappointed. Iron is, however, a most important commodity to Japanese industry, only very small deposits thereof being found in Japan, and the South Manchuria Railway therefore continued to develop the plant although this involved a heavy financial loss at the time. Over Y.45,000,000 has been spent on the plant, which contains two blast furnaces, each capable of producing 250 M.T. a day; four coke ovens, each with a capacity of 130 M.T. a day; gas works, electric plant, etc.

Hematite Process

The principal problem before the management consisted in devising method for handling economically the low grade ores which form the greater part of the deposits. After considerable study, one of the Japanese experts attached to the plant invented the so-called hematite reducing system and magnetic concentration method. A large concentration plant was built which provides a preliminary treatment of the ores making it possible to recover their metal content economically. The annual pig iron output of the plant was 88,263 tons in the fiscal year ending March, 1926, but the production is to be increased to 200,000 tons annually.

Daido Denryoku K.K. Adds to System

(Continued from page 303)

The 55 kv. bus is a double bus and any 28,200 kva. transformer bank can be connected to either or both busses. In a similar manner the 14-55 kv. feeders can connect to either or both bus bars. Some of these feeders connect to steam stations near Osaka that act as reserves as well as for distributing stations at 11-22 kv. to many local sub-stations. This 55 kv. bus also supplies two 850 kva. and one 2,500 kva. transformer banks supplying 3.3 kv. local service bus.

The tertiary 11 kv. windings from the 28,200 kva. transformer banks each have a bank capacity of 15,000 kva. and are normally connected to a definite synchronous condenser of 15,000 kva. rating. In the three banks used with the Westinghouse condensers 3.3 kv. taps are brought out so that this tap voltage can be used for self-starting of the condensers. For the three 15,000 kva. units that employ operating motors the 3.3 kv. voltage for these motors is obtained from the station bus.

The 60,000 kva. transformer bank supplies the 77 kv. bus to which are connected two outgoing supply feeders and two tie circuits that are normally incoming but may operate as outgoing feeders. The 11 kv. winding from this 60,000 kva. bank is of 30,000 kva. rating and supplies a synchronous condenser of 30,000 kva. capacity. Taps on this 11 kv. winding can be used for the operating motor but usually this motor will be fed from the 3.3 kv. station bus.

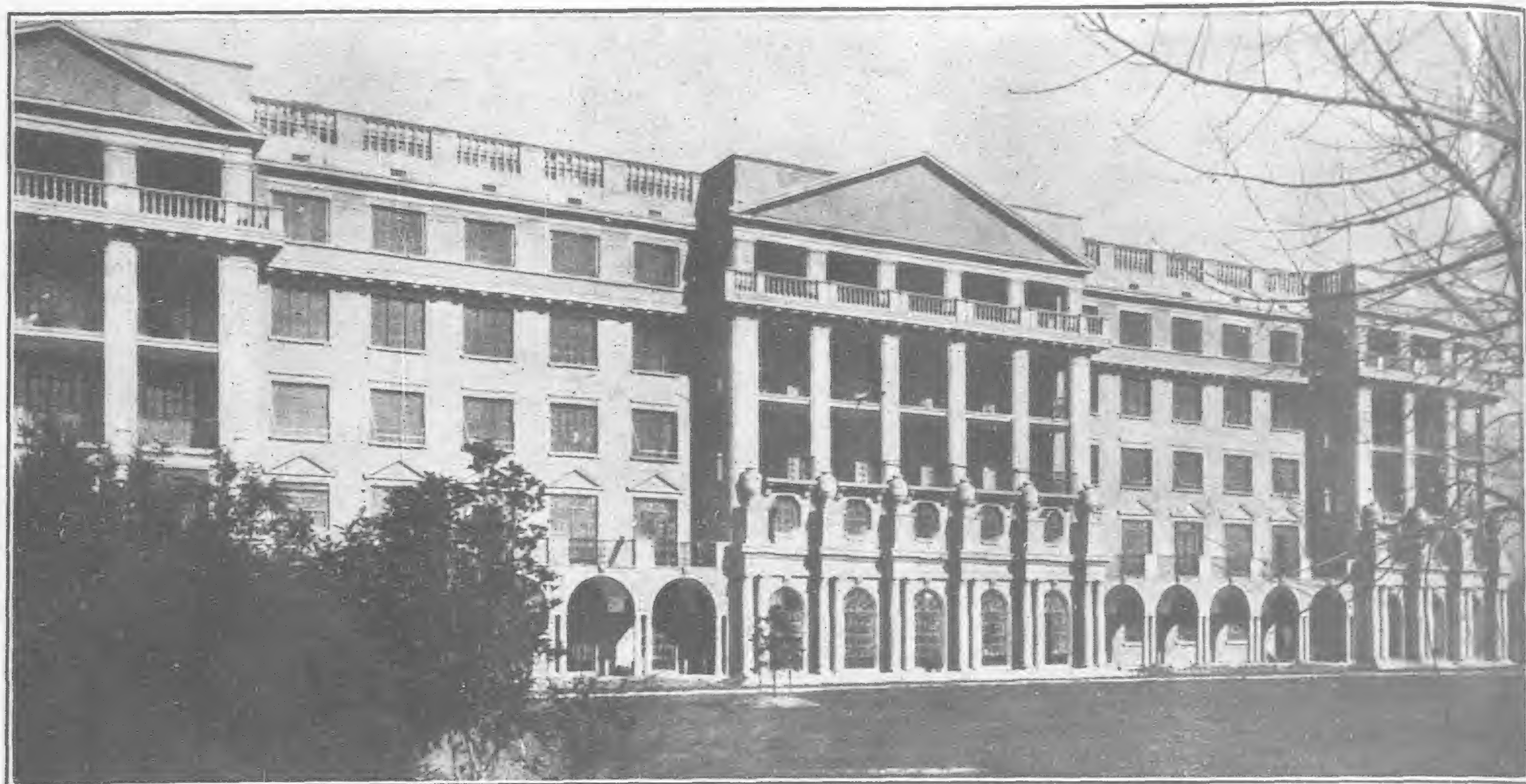
Although there is a 11 kv. transfer bus to which the tertiary winding of any condenser bank can be connected it is not usual to operate the tertiary windings of two or more banks in parallel on this transfer bus. In a similar manner, although it is possible to connect the 3.3 kv. starting taps to the station bus this is considered an emergency condition.

In the control room of the station is installed an operating benchboard with a complete wiring diagram of the station worked out in the miniature bus on the inclined horizontal top of the desk.

For the two 140 kv. line circuits, two bus tie circuits and seven transformer banks, a total of eleven 154 kv. oil circuit breakers were furnished. For the 77 kv. circuits five 88 kv. oil circuit breakers were provided. For the 55 kv. circuits twenty-five 73 kv. oil circuit breakers were provided. All of these breakers are Westinghouse outdoor type with condenser bushings.

For the 11 kv. circuits from the tertiary windings of the transformers and the main connections to the synchronous converters, Westinghouse type CO-11 breakers were supplied for indoor service in masonry compartments. For the 3,300 volt circuits smaller frame mounted breakers were used.

The switching equipment is essentially all Westinghouse.



The Country Hospital, Shanghai

Refrigerating Plant in the Country Hospital, Shanghai

REFRIGERATING plants are being always more and more adopted in hospitals, sanatoria, etc. In Europe and in countries in the temperate zone, refrigeration is in general only of importance of cooling store rooms for provisions and for making the artificial ice required in treating cases of fever or in surgical work. Artificially cooled water is employed for hydro-therapeutic purposes; mortuary chambers and dissecting rooms are also in many cases cooled.

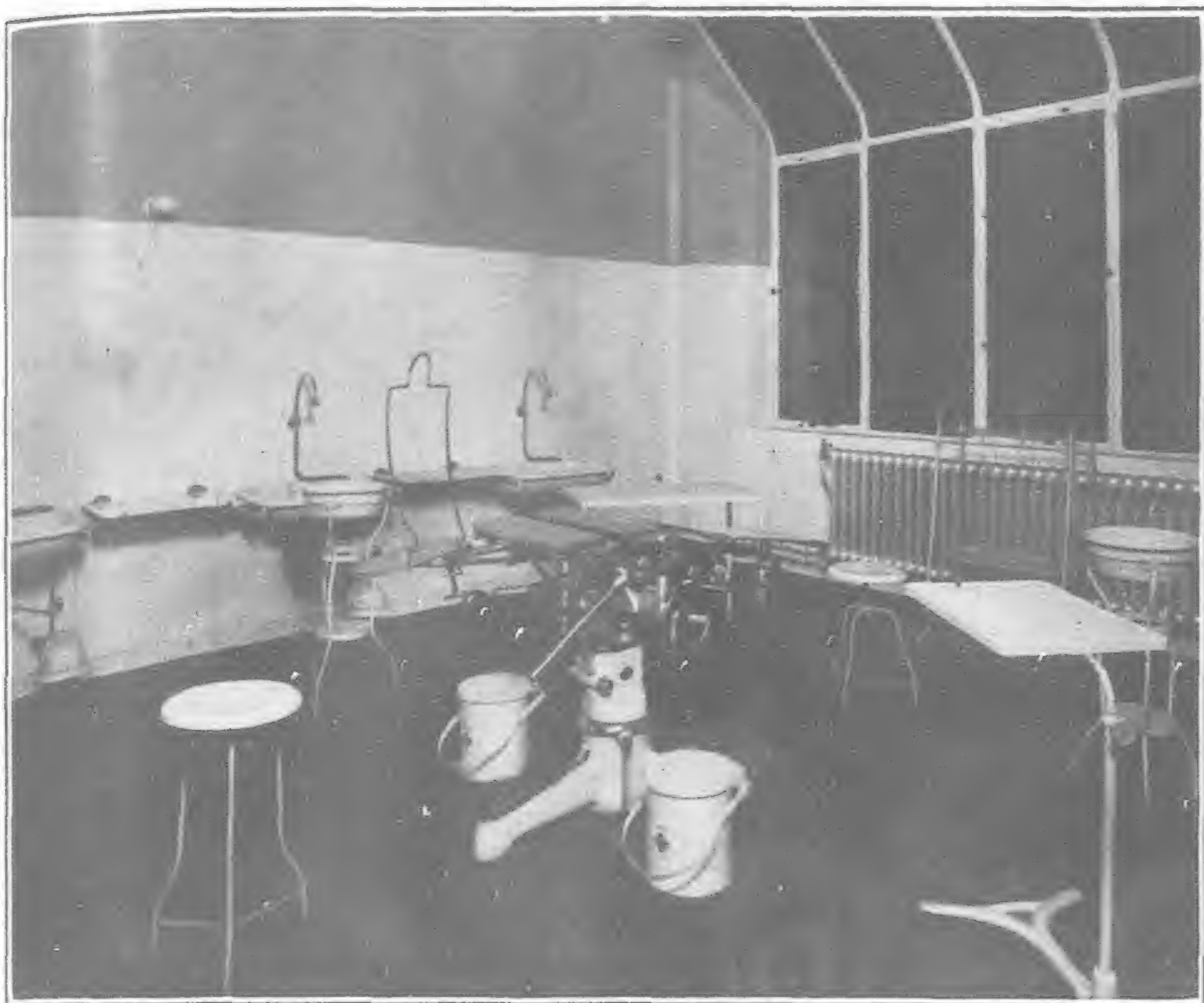
To all these applications of refrigeration in hot countries there has also to be added

the cooling of air in the wards and above all in the operating rooms.



The Lobby of the Hospital

Artificial cooling is accompanied by a drying of the air, a factor which may be of great importance, since living in hot and at the same time moist rooms is insupportable even for people who are well. For the patients in a hospital, the cooling and drying of the air means a great relief; and more than that, difficult operations that formerly could hardly be performed at all in summer in countries with a hot, moist climate, can nowadays be



Operating Room (Cooled)

carried out without hesitation when the air is cooled and dried artificially.

Sulzer Brothers, Winterthur, have supplied several refrigerating plants to hospitals for cooling and particularly for drying the air in the various rooms, including the operating rooms; such a plant has lately been supplied to, amongst others, the Country Hospital, Shanghai.

Shanghai is situated approximately on the 32nd degree of latitude, nearly the same latitude as Casablanca and Cairo. In summer the weather is very hot. The highest mean daily temperature rises to 90 deg. F., whilst the absolute recorded is 103. As Shanghai lies near the mouth of the Yangtzekiang, the relative humidity of the air is also very high. For the months of June, July and August, the monthly average mean is 80 per cent., whilst the maximum rises to 90 per cent. A combined cooling and drying plant for the air is therefore particularly important. Last summer the plant was put in service and is working to the perfect satisfaction of the hospital management. As is well known the drying and cooling of the air in living-rooms is a difficult problem, since on the one hand all precipitation of moisture in the rooms must be avoided, and on the other hand there must under no circumstance be any trace of draughts. In the Shanghai hospital the problem is solved by cooling the air by means of water before it is admitted to the rooms, the water being first of all cooled down to the required low temperature by means of a refrigerating plant. The cooled air is blown into the rooms through narrow slits arranged under the ceiling, the incoming air being directed upwards towards the ceiling. The air inlet slits are distributed uniformly in each room. In this manner it has been found possible to admit sufficient air to the rooms without creating draughts. The cooling has not only proved successful, the hospital management even believes that the successful treatment of some particularly serious cases of illness must be attributed to the excellent working of the air cooling plant. The cooling and drying of the air in the wards and operating rooms is so thorough that its effects are also perceptible in the corridors. Even on days when the percentage of

moisture in the outside air is exceptionally high, no moisture is precipitated, and also when the air shutters are wide open, there is not the slightest annoyance from draughts in the rooms. The necessary refrigeration is supplied by a vertical Sulzer ammonia compressor and amounts to 196,000 B. Th. U. per hour at an evaporating temperature of + 37 deg. F. and a condensing temperature of + 82 deg. F. The compressor is driven by an electric motor of 11.5 H.P. rating and serves exclusively for cooling the fresh water that is used for cooling the rooms. As a rule the compressor is run daily from 9 a.m., to noon and again from 2 to 4 p.m., and exceptionally until 6 p.m., when operations are being performed. The cold-water circulating pump for the air cooling runs continuously from 9 a.m., until 5 or 6 p.m.

A second Sulzer compressor serves for ice making and cooling the store rooms. It has a rated capacity of 92,000 B. Th. U. per hour at an evaporating temperature of + 10½ deg. F. and a condensing temperature of 82½ deg. F. It is driven by an electric motor of 13½ H.P. rating and runs on an average 9 to 10 hours daily. Fig. 11 is a view of the exterior of the Country Hospital, and Fig. 12 shows the large entrance hall which serves as a sitting room for convalescents and reception room for visitors.

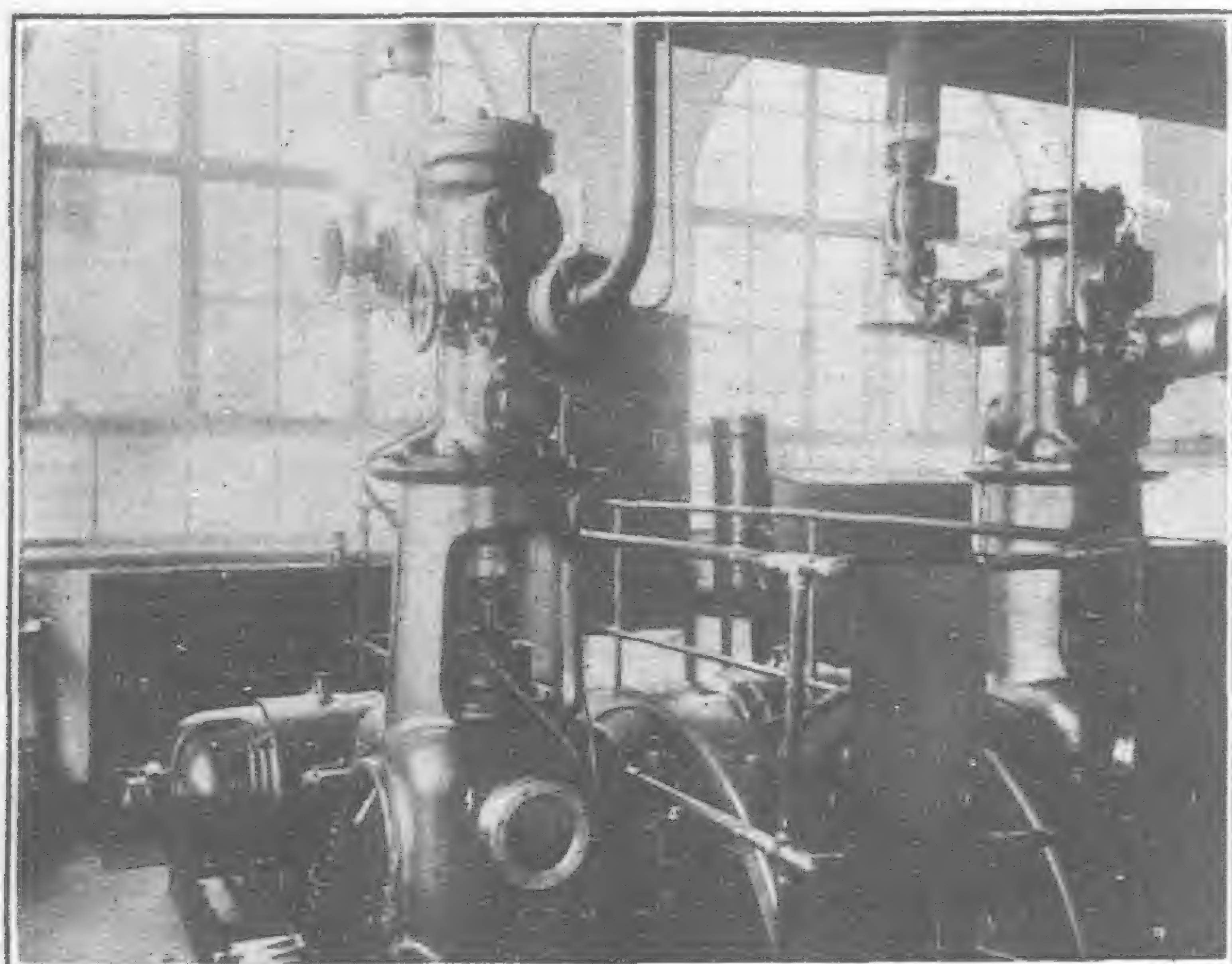
Sulzer Brothers also supplied a refrigerating plant for ice making and milk cooling to the Hospital Farm,* Shanghai, which supplies milk to the Country Hospital and the Paulun Hospital. With this plant two tons of ice are made daily.

The milk from the farm is cooled by being allowed to trickle over a cooler through which cold brine is circulated by means of a pump. The milk bottles are kept in a cupboard built onto the ice store. Fig. 13 shows the vertical Sulzer ammonia compressor with the accessory machinery. The compressor has a rated capacity of 46,400 B. Th. U. per hour and is driven by an electric motor.

* Now Stey's Dairy Farm



Room for Therapeutic Treatment (Artificially Cooled Water)



Sulzer Refrigerating Plant

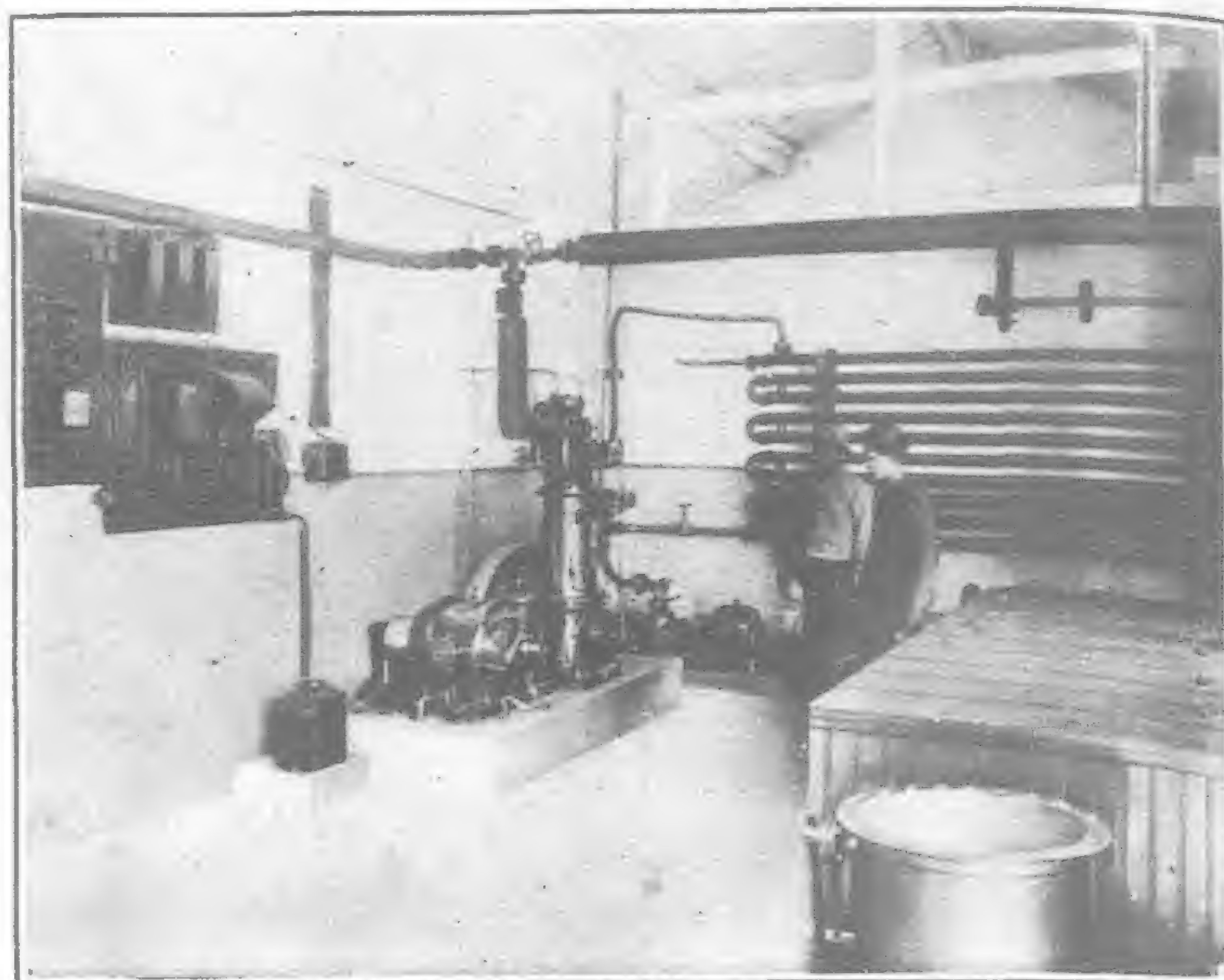
The proprietor of the farm writes as follows concerning the working of the plant:—

"I am very pleased with this Sulzer plant. In 24 hours I can make 2 tons of ice and in addition to that I also cool a small room where the milk and sundry milk products are stored. The machine also works an additional 2 hours a day for the milk cooling apparatus. Immediately after the cows are milked, the milk is brought by the cooling apparatus to a certain temperature so that it can be kept for a longer period in the height of summer temperature than would otherwise be possible. I cool about 400 bottles of milk a day. During the whole of a very hot summer I have not had a single complaint."

"Sulzer" Marine Refrigerating Plant

MOST of the firms who have made a name as builders of refrigerating machines on board ship in the past have specialized in steam driven compressors working with CO₂, and as those

machines were mostly of the horizontal design, running at low speed. These firms are now meeting with considerable difficulties in their endeavours to adapt their machines to driving by modern Diesel engines. One of the main difficulties to be dealt with is the question of space. Shipping people are accustomed to accommodate the refrigerating machinery on the 'tween-deck, which has a headroom of abt. 8-ft. to 8-ft. 6 only and it is very difficult to find a good engine which can be erected within this headroom. Horizontal engines, which otherwise would be suitable, cannot be recommended for the obvious disadvantages which are well known to anybody familiar with the



Ice-Making Plant. Stey's Dairy Farm and Ice Factory, Shanghai

history of the Diesel engines. Among the large firms who were originally building horizontal Diesel engines, those best known have given up the horizontal design entirely. Horizontal engines of larger powers may be called obsolete to-day.

In view of this fact, the Diesel department, of the Sulzer Company evolved a compact group Diesel engine-compressor, which can be installed on the 'tween-deck. It consists of a vertical double cylinder ammonia compressor working on the compound principle at a speed of 350 r.p.m., direct coupled to a 6 cylinder 4 cycle Diesel engine of the airless injection type fitted with starting air compressor and adapted for service on board ship. The output of the group is abt. 420,000 calories (abt. 1,650,000 B.T.U.) per hour when operating at an evaporation temperature of -15°C (5°F) and a condenser temperature of $+30^{\circ}\text{C}$ (86°F). The same compressor, when working at -25°C (-13°F) $+38^{\circ}\text{C}$ (abt. 100°F), would produce 225,000 calories (abt. 900,000 B.T.U.) per hour.

The power input in either case will be abt. 200 B.H.P. and the engine to drive the compressor has therefore been chosen with a normal rating of abt. 225 B.H.P., thus containing a certain desirable margin to meet fluctuations in service and overloads.

The compressor is fitted with 2 stepped pistons, which can be withdrawn from the top, whereas the pistons of the Diesel engine are to be withdrawn from below after unscrewing cylinder from the frame.

The engine can be designed for a speed regulation down to abt. 250 r.p.m. At the same time, the compressor can be reduced in output by 50 per cent. approx., so that, for the complete set, a reduction in output down to abt. 30 per cent. of full load can be realised. This is a similar range of regulation as was possible with the old steam engine driven compressors. As regards capacity, this will of course have to be worked out in each individual case.



Kitchen



Landing a Cargo of Weeds



Japanese Fishermen Uprooting Weeds

Vast Sea Weed Wealth of Japan

By Alfred Elden of the "New York Herald Tribune"

DISS Josephine Tilden, head of the botany department of the University of Minnesota, returning from the recent Pacific Science Congress at Tokio, declares that the ideal food for all ages is seaweed. In bygone days, she says, people living near the seacoast ate it and they were healthy.

Seaweed, Miss Tilden points out, is the basis for all sea life and all sea food. It is as easy for babies to digest as it is for adults, and it may be served in many palatable forms. Rich in iodines, certain varieties are valuable for their medicinal properties.

In 1904 Dr. Hugh M. Smith, then United States Deputy Commissioner of Fisheries, made two comprehensive and valuable reports on this same subject. He showed first what Japan was doing with its seaweeds, and then he showed what the United States was not doing. Conditions in both countries have changed little.

The Oriental agriculturists are utilizing seaweeds in countless ways. Our coastal agriculturists use a little rockweed for fertilizer. In the fall the heavy gales and seas pile great masses on the shores and near-by farmers haul cart loads of it to their fields. They can hardly ignore this gift of the gods, literally tossed gratis almost into their dooryards. In the process of soil enrichment nothing surpasses ordinary rockweed.

At a few points on the New England coast the species of marine algae known as Irish moss and dulse are commercialized to a limited extent.

Seaweeds are among the most valuable of the aquatic resources of the Japanese Empire. Marine plants are utilized extensively in France, Ireland, Scotland and other European countries, in the East Indies, in China and elsewhere, but in no country are such products

so commercially important as in Japan. The value of the seaweeds prepared in Japan at the present time exceeds \$2,500,000 annually, exclusive of large quantities of marine plants which do not enter into commerce, but are used locally in the families of the fishermen.

Japan has a coast line of 18,000 miles, its algae is abundant and varied, its people ingenious in putting the many different kinds of plants to appropriate use.

One of the most interesting of the products of the Japanese seaweeds is called kanten. This word means "cold weather," and was selected because it is only in the colder months of December and February that kanten can be successfully made. It is comparable to our isinglass and is used for some of the same purposes.

Kanten was first made about 1760 and in the beginning was simply a mass of jelly formed by the boiling of the seaweed. To-day the output of the 500 factories producing it is in the more convenient form of sticks and bars. It is used largely for foods such as jellies and as an adjuvant of soups and sauces; also for clarifying sake, the native rice wine. Kanten is valuable wherever a gelatin is required and is superior to animal isinglass.

Algae Contains Glue

Funori is the name given to a kind of glue obtained from several species of algae and its manufacture is carried on in more than 100 establishments. This product has been made in Japan since 1673.

One of the most important of Japan's marine vegetable preparations in kombu, the annual sales in Japan and China being enormous and steadily increasing. It is made from the kelp family. The fishermen go in boats to the waters where it is abundant and

(Continued on page 312)



Inspection of Sea Weeds



Drying the Weeds in the Sun

Canton's New Wireless Station

By Thom Wah-ding, Supervising Engineer of the Government Radio Laboratory

THE development of wireless communication in the Province of Kwangtung, like the development of many other enterprises, have been most far-reaching and unsurpassed by no other province in China. Scattered throughout the Province there are about ten stations of various types in operation, not to mention the navy

ship stations under government control. Some fifteen years ago, the Marconi Spark Gap System was used; then the German Telefunken Quenched Spark and the American De-forest (Oscillation Transmitter) Tube stations followed respectively.

Now the Government, with an attempt to develop still better and more efficient means of communication (particularly with stations abroad), is installing a modern High-Frequency Alternator Wireless Station in the City of Canton. The power output of the station is eight kilowatts in the antenna so it may be considered as the largest of its kind in Kwangtung. The entire equipment is of German make, being manufactured by the C. Lorentz, A. G., Berlin - Tempelhof.

The station is complete with its self-contained power generating plant, a high-pressure vertical type diesel engine, which is capable of develop-

ing a maximum energy of 50 B.H.P. when running at a speed of 240 R.P.M. By means of a belt it operates a 34-Kilowatt 220-volt DC-generator. The current derived from this generator will be made to operate a DC-motor which is directly coupled to the high-frequency alternator. Current for other miscellaneous uses in the station will also be supplied by the generator. Besides the diesel engine as prime mover, an AC-motor

which takes 3-phase current from the city 60-cycle 220-volt mains, is also installed as necessary spare.

The DC-motor which is directly coupled to the high-frequency machine has a speed of 2000 to 3000 R.P.M., suitable for 220 volts at 154 amperes. The high-frequency alternator has a power output of 30-KVA, generating current at 500 to 800 volts, 0.60 amperes at 8000 cycles. The various controlling connections of the electrical machines are taken to a switchboard in the engine room. A full diagram of the connections is shown in Figure I.

The Antenna Mast (Fig. 2) is of steel construction and in several sections, providing a total height of 100 meters. The bottom of the steel tower, as shown in Fig. 3, is insulated by a porcelain insulator upon which the entire weight of the mast rested. There are three sets of three-stranded

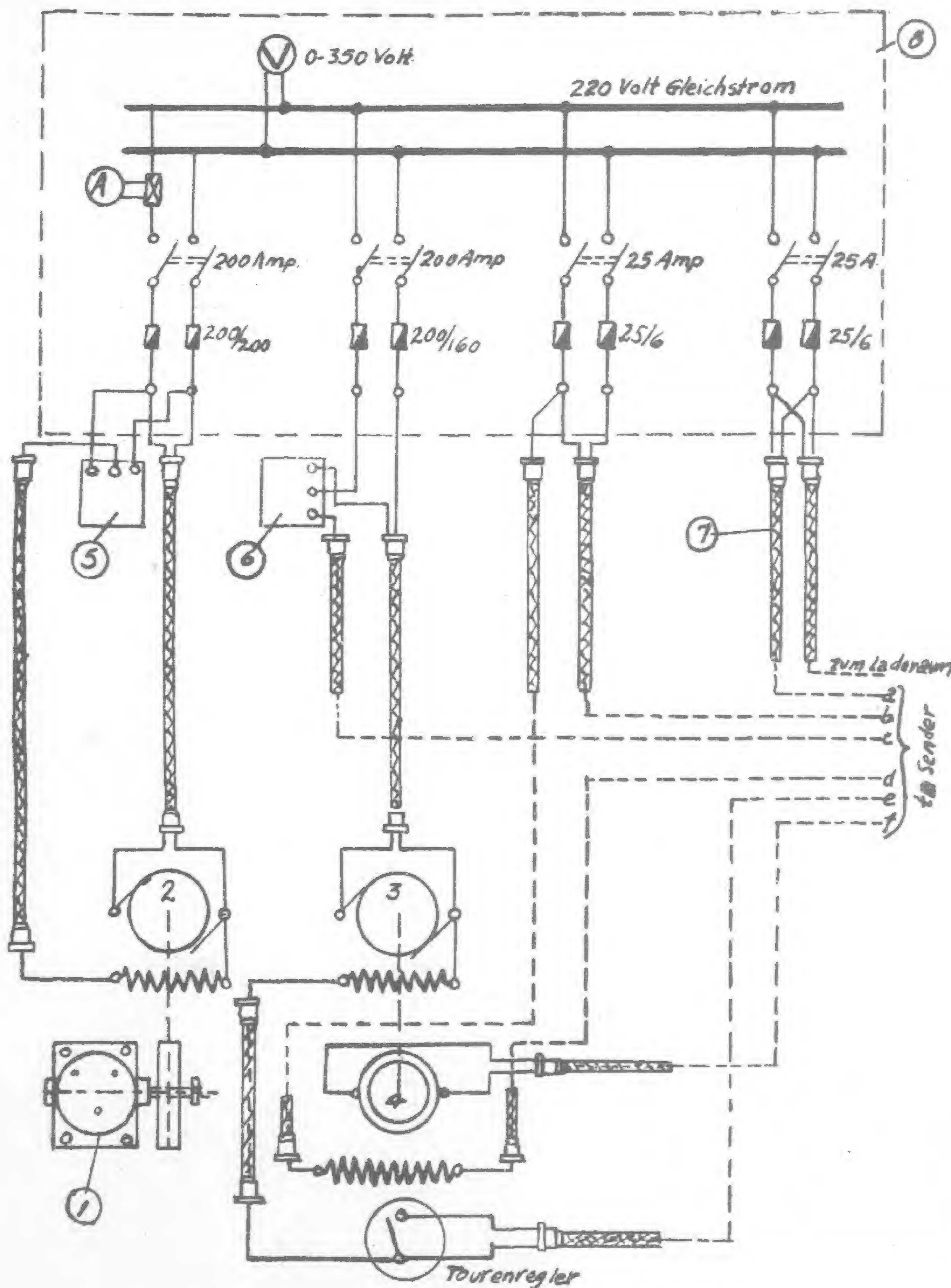


Fig. 1.—Diagram of Power Plant Connections—8 K.W. Sender

1, 50 B.H.P. Diesel Engine ; 2 D C Generator ; 3 D C Motor ; 4 High Frequency Alternator ; 5 D C Regulator for generator ; 6, Regulator for motor ; 7, Cable wiring connections ; 8 Switchboard.



Fig. 2.—The Antenna Mast



Fig. 3.—Base of Antenna Mast

galvanized iron rope stays, each stay being insulated from the ground by porcelain insulators.

the latter for indicating antenna radiation. The wave-length of the transmitter is 1500 meters minimum and 6000 maximum and variable by varying the capacity of the various condensers.



Fig. 4.—Antenna Lead-in and Station Building

Mechanical devices are provided for regulating the tension of each stay. The aerial proper is of the T-type, consisting of 4-stranded phosphor-bronze conductor, approximately 200 meters long. Fig. 4 shows the antenna lead-in and station building under construction. At a lower height of the aerial towers is stretched a single wire antenna for the purpose of receiving messages during transmission.

The "earth" connection or claw earthing arrangement consists of eight radial stars, covering considerable area. The eight stars are laid out in two rows beneath the antenna. Each star is composed of eight copper wires each of which radiates to a distance of about ten meters from the center of the star. The wires are buried underground about two meters deep. Connection to the radiated wires is made at the star center, all connections brought to the surface and lead to the building on wooden poles. Figure 5 shows the wiring layout for the earthing arrangement.

Fig. 6 indicates the scheme of connection of the transmitter. The high-frequency alternating current is controlled by means of a morse key which is in circuit with a magnetic relay joined in parallel. The relay is opened when the alternating current is passing through its zero value, thereby preventing any injurious sparking at the key contacts and ensuring rapid break in the circuit. The power output in the antenna is regulated by means of the variable inductance and variometer. The variometer in the oscillating circuit is connected in series with a battery of condensers. These condensers are made up of thin zinc plates separated by sheets of glass and immersed in paraffin oil. In the radiating circuit is the frequency changer connected in series with the variocoupler, variometer and helix. Coupled to this circuit is a wavemeter and glow-tube indicator,

There are two sets of receiving apparatus which will be very convenient under extraordinary working conditions of the station. One set of the receiving apparatus uses an outdoor antenna, while the other one uses an indoor loop antenna provided with direction finding equipment. The receiving apparatus consists of Sound Selector, Primary and Secondary Receiver, 2-stage Low-frequency Amplifier, Radio Frequency Amplifier and Heterodyne Apparatus.

The Station has been under construction for some months and as now stands is about complete. Besides official dispatches, the new station is expected to be open for commercial traffic, news services and marine communications. It will probably have a transmitting range of 3,000 miles by day and about double that range by night. Under favorable meteorological conditions the receiving apparatus can receive messages from a greater part of the world. It can readily be seen that such a transmitting and receiving range is very serviceable for commercial and general traffic. The Station will be able to communicate with any station in the Far East, including those of Russia, Japan, Cavite-Philippines, Malabar-

Java and Guam. With the interlinking of the Guam or Cavite high-power stations traffic and news may be relayed to Honolulu and America; and with the Malabar Station commercial traffic can be handled with any country in Europe.

First-class shipping facilities will immediately be developed in Canton with the opening of the Whampoa Port: therefore, as a means of marine communication, the new radio station will aid all ships calling at and sailing from ports of China. The ships at sea will get a possible

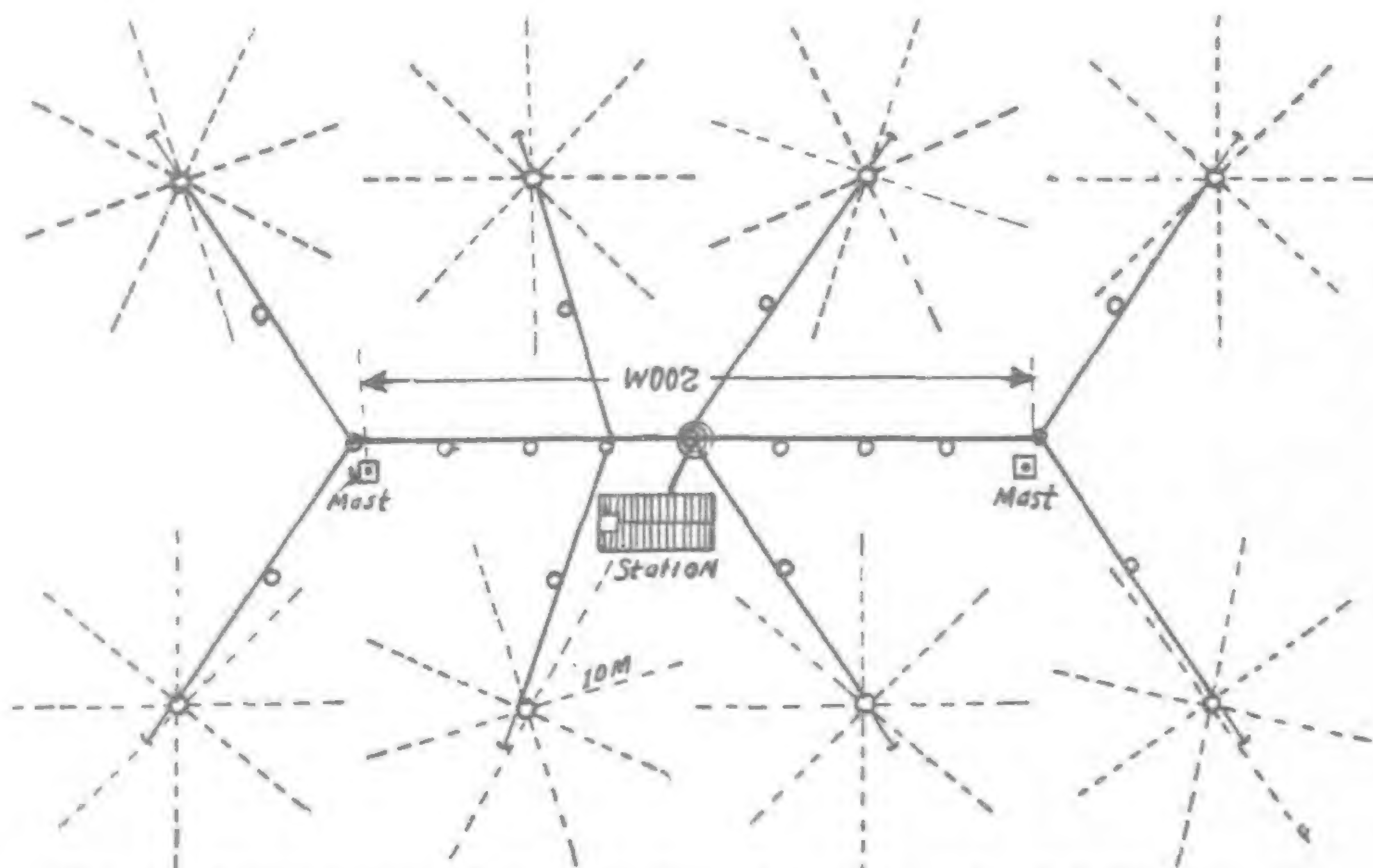


Fig. 5.—Wiring Layout of Claw Earthing Arrangement for 8 K.W. Transmitter

means of averting disaster by receiving typhoon warnings and other weather information from the station. Better import and export business will eventually be developed as merchants will know beforehand when to ship and when to expect arrival of goods. For these reasons, it is hoped that the new station will be of service to shipping and navigation.

As regards news services, since the station has two receiving sets, one will be set aside, or at least for the most time devoted to the receiving of

Condenser Types.	
Gf. 3.1	= 100000 CM
Gf. 9.1	= 11000 "
Gf. 11.1	= 7365 "
Gf. 5.1	= 36360 "
Gf. 13.1	= 5400 "
Gf. 15.1	= 3960 "

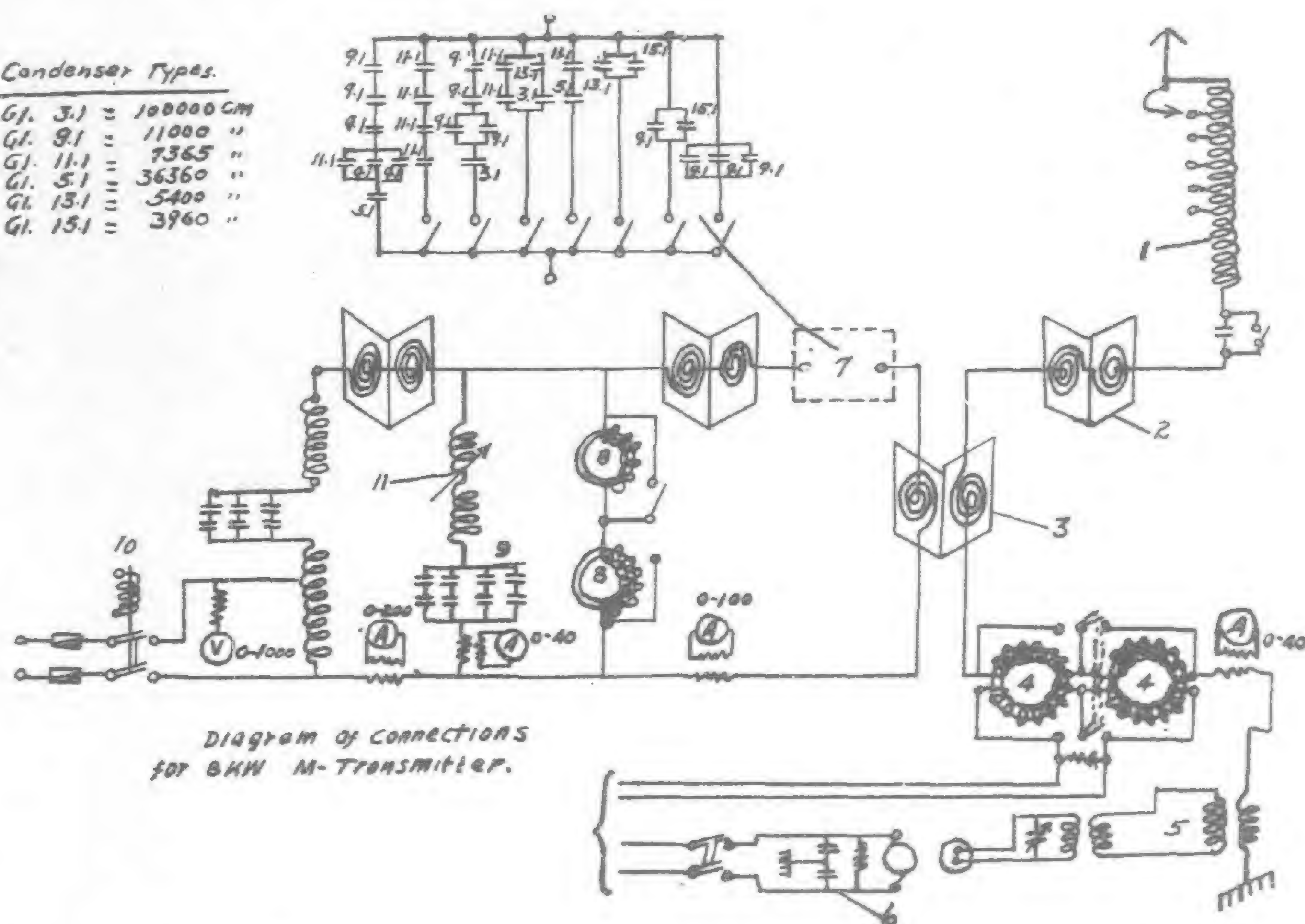


Diagram of connections for 8 K.W. Transmitter.

Fig. 6.—Diagram of Connections for 8 K.W. Transmitter

1, Helix; 2, Variometer; 3, Variable coupler; 4, Frequency Changer; 5, Wavemeter; 6, Glow-Tube Indicator; 7, Zinc Plate oil condenser; 8, Oscillating Transformer; 9, Mica Block Condensers; 10, Magnetic relay; 11, Variable inductance

press information from the Nauen Station of Germany and from other European stations as well as from the Pacific Coast of America through the naval trans-Pacific circuit, such as news from San Francisco to Honolulu, Guam and Cavite. The Government will be able to transmit news to all parts of the Far East concerning current events of the government itself and Kuo-mintang. These will be broadcasted and the people of China at least can learn quickly the truth concerning important events.

Latest Addition to the British Navy

H.M.S. "Nelson"—The H.M.S. *Nelson*, latest and largest addition to the British Navy was built by Messrs. Sir W. G. Armstrong Whitworth & Co., Ltd., who built the vessel. The picture below gives a good general idea of the departure from the usual battleship design. The main armament is 9-16 inch guns in triple turrets, all mounted forward in echelon and with a wide



H.M.S. "Nelson"

range of fire fore and aft. The full armament comprises 54 guns, besides torpedo tubes, etc. The old type of conning tower and control stations on the masts has given place to a huge armoured citadel low down on the vessel from which the whole control and working is operated when in action. It will be noticed how far aft the one funnel and the controls are placed, also the engine and propellers. The *Nelson* has been the first post-war primary fighting vessel designed for the British Navy and based upon the experience gained during the Great War.

Vast Sea Weed Wealth of Japan

(Continued from page 309).

with hooks on long poles twist and tear it from its strong attachment on the rocky bottom.

This kelp is spread out on the beaches and carefully dried, after which it is trimmed into uniform size and packed in bales for shipment. There are more than a dozen forms in which kombu is prepared for food, showing the ingenuity of the Japanese in providing a varied regimen from a single article.

Kombu enters into the dietary of every Japanese family, and is one of the standard foods of the country, the various preparations having different flavors. It is cooked with meats and soups and is also served as a vegetable. Powdered kombu is used for tea, and on rice like curry powder.

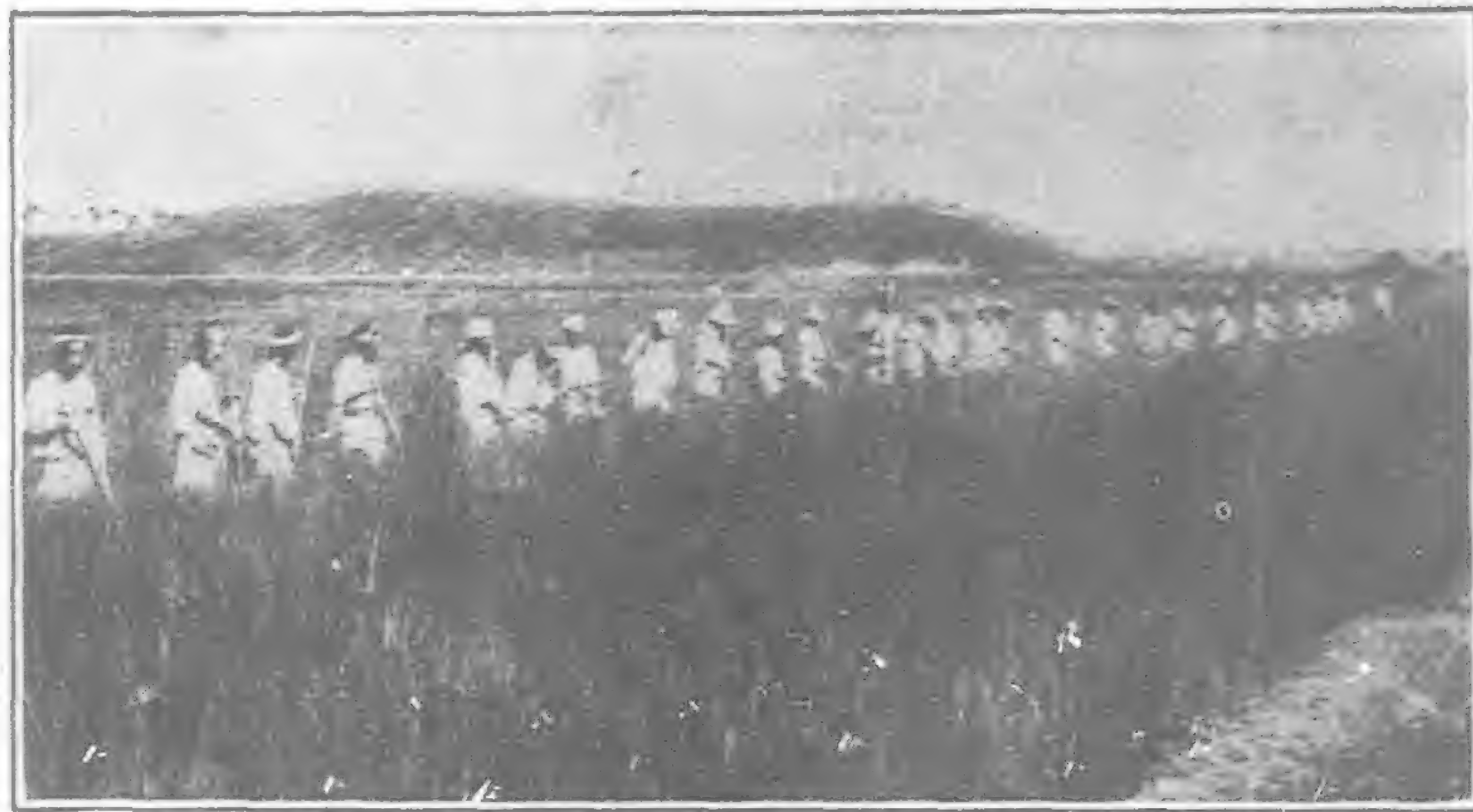
From a very early period the Japanese have made use of the red laver, or, as they call it, amanori. The cultivation of this porphyra is one of the most important branches of the seaweed industry, and gives to Japan a unique position, for in no other country is this form of aquiculture practiced. The financial results are quite remarkable and are surpassed by but few branches of agriculture.

Before the dried amanori is eaten it is put over a fire to make it crisp, its color changing to green under the treatment. It is then crushed between the hands and dropped into sauces, soups or broths to impart flavor. Pieces dipped in soup are often eaten alone. Recently it has been boiled and put up with Japanese sauce in tins.

At railway stations, at street stands, on the push carts of vendors as well as in private families, a common seaweed food in Japan is called sushi, and it takes the place of the American sandwich. On a sheet of amonori boiled rice is spread, and on the rice strips of meat or fish are placed. The whole is then made into a roll and cut into transverse slices.

Iodine is obtained in Japan from about a dozen species of marine algæ, and refining factories are located at Tokio and Osaka. This is one of the world's chief sources of supply for iodine extracted from marine plants.

In addition to the commercial algæ many other species than those mentioned are employed for home purposes. Some are used for making jellies, some as vegetables, some as salads, some as condiments, some for decorative purposes. Large quantities are also used for fertilizers.



Japan Hopes to make Korea the Granary for Rice, and with fair Hopes of Success, for the Old Methods of Cultivation are giving Way to the New, so that Korea is becoming a great Rice Producing Country

Rice in Chosen

By T. Ikeda, Chief Engineer for the Water Supply, Korea

CHOSSEN has been an agricultural country from of old, and her national foundation has ever rested on agriculture. The backbone of her agricultural system is rice. The climate and soil of Chosen are well suited to the cultivation of rice, and the major part of her population engages in agricultural pursuits, so the trails marked by the undaunted efforts by the authorities in the encouragement of this industry in the past are plainly visible.

At the very outset, the new Government of Chosen instituted investigations into the various industries of promise with a view of ascertaining which might be relied upon to bring the most certain yield and benefit the masses in the highest degree, with the result that rice was plainly pointed out as the premier one.

Keeping this in view, the Government, from the time of annexation, has worked for the transformation and development of the yield of rice. Fortunately its endeavors have so far been fruitful that the supplying of all domestic needs is met on the one hand, and on the other a large volume of rice is yearly available for export, ranging in amount from twenty-four million eight hundred thousand to twenty-nine million seven hundred and sixty thousand bushels (24,800,000 to 29,760,000), having a total value of more than two hundred million yen (200,000,000). This means an average increase of over ten million yen (10,000,000) a year in trade as compared with years previous to annexation, and this, of course, directly or indirectly affects the majority of the twenty million inhabitants of the country. This is a concrete form of the blessing the rice industry has been to the country in the past and to-day no one agricultural product excels rice in its enrichment of the masses of the people.

Happily there is still plenty of room in Chosen to allow of increase in the yield of rice, and a few years ago the Government General drew up a program for accelerating its development.

This program was first drawn up in the year 1920, and was designed to improve existing fields and the system in use over an area of one million and twenty-nine thousand acres (1,029,000) and so render them capable of an increased yield of forty-nine million six hundred thousand bushels (49,600,000), of which half could be exported.

In the space of six years, that is, by the end of the year 1925 up to improvement of two hundred and twenty thousand five hundred acres (220,500) was effected, but from the experience thus gained many deficiencies in the plan were brought to light, and to overcome these a revision of it was made, the gist of which is as follows:

The revised program to be executed in 12 years beginning with 1926, covers eight hundred and fifty-seven thousand five hundred acres (857,500) and concerns itself with the improvement of those lands and the methods of their cultivation. Its aim is to secure an increase in the yield of rice by forty million six hundred and seventy-two thousand bushels (40,672,000) per annum, and the amount needed to effect this improvement is estimated at three hundred and three million two hundred and fifty thousand yen (Y.303,250,000), including Government subsidies to a total of Y.65,070,000. In addition to these subsidies the Government has appropriated 8,440,000 for probable expenditure in connection with the supervising and encouragement of the work of improving these lands, Y.3,500,000 to secure improvement in farming methods, and Y.40,000,000 for the special purpose of accommodating the farming populace with loans at a low rate of interest to enable them to purchase fertilizers and to make improvement in their methods.

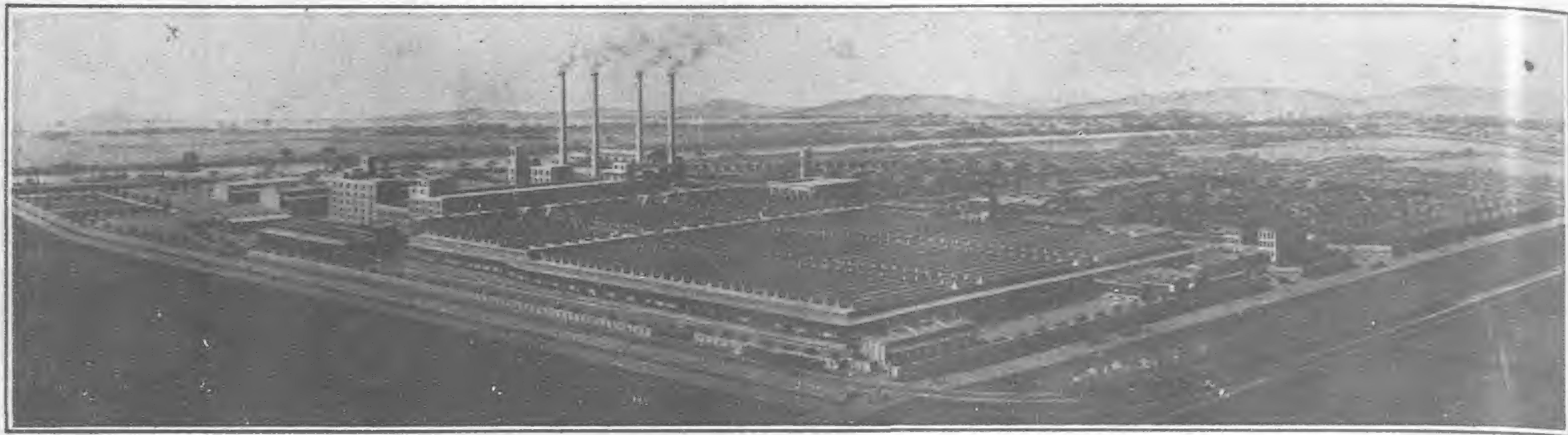
The principal items of the plan are as follows:

The Government-General has made investigations all over Chosen by close examination of each field in succession



A bearer of burdens in old Korea.

(Continued on page 316)



Iwakuni Factory of the Teikoku Artificial Silk Company, Ltd.

The Artificial Silk Industry of Japan

THE artificial silk industry is in course of marked development in Japan and is being watched with keen interest by capitalists and other interested people.

In March, 1926, when the import tariff was generally revised, the Government raised the import duty on artificial silk to 125 yen per 100 kin as against 87.90 yen per 100 kin as previously, for the object of protecting the home industry.

Each artificial silk mill in existence is being extended, and new mills are projected by prominent business men and important woollen and other companies.

The industry was first started in Japan in 1913, by Suzuki & Co. with the viscose system. Since then, not a few mills were built by other parties, but some of them were shut down, and the remainder experienced vicissitudes of fortune before they reached the present condition of development and prosperity.

The history of the artificial silk industry in Japan may be divided into three periods. The first period began in 1914, when the World War broke out and the foreign supply of the goods was suspended, giving a chance to the enterprising Kobe firm, Suzuki & Co., to launch its enterprise, ahead others. This period ended in 1920, when the economic world had an adverse reaction from the former prosperity. The second period was from 1921 to 1923, in which latter year occurred the great earthquake. The third period dates from 1924 to the present time.

The first period was that of experiments, and the mills established then mostly went out of existence. The checking of artificial silk importation by the war and the activity of silk weaving in the interior stimulated later projects in the artificial silk line, which was most apparent in 1916 and 1917.

All of them adopted the nitrified fibrine system or the copper ammonium system, with a view to producing explosives in time of emergency.

They encountered, however, technical difficulties, which led to their dissolution, amalgamation or reorganization.

The second period was the period of natural selection, when some, which were financially incapable of meeting that trying time, vanished, while others, which were capable of it, strengthened their foundation.

The industry then entered upon the first stage of development. In the economic crisis which overtook the economic world of Japan in 1920, there were more downfalls. When trade revived a little afterwards, however, the industry resumed activity.

In 1921, the Imperial Artificial Silk Co. affiliated with Suzuki & Co., built its No. 2 mill at Hiroshima, and a few other mills were put up by other parties. Subsequently, the Japan Cotton Trading Co. bought up the Asahi Artificial Silk Co., with which it organized the Asahi Silk Weaving Co. These mills adopted the viscose system.

The earthquake in 1923 had an epoch making effect on this industry as on other lines. A series of declines in foreign exchanges had the result of diminishing the importation of artificial silk, while the idea of a simple and economical life instilled into the people by the catastrophe had the effect of expanding requirements for the comparatively inexpensive artificial silk products, creating a greatly increased demand for that silk. This opened the way for the present great expansion of the industry.

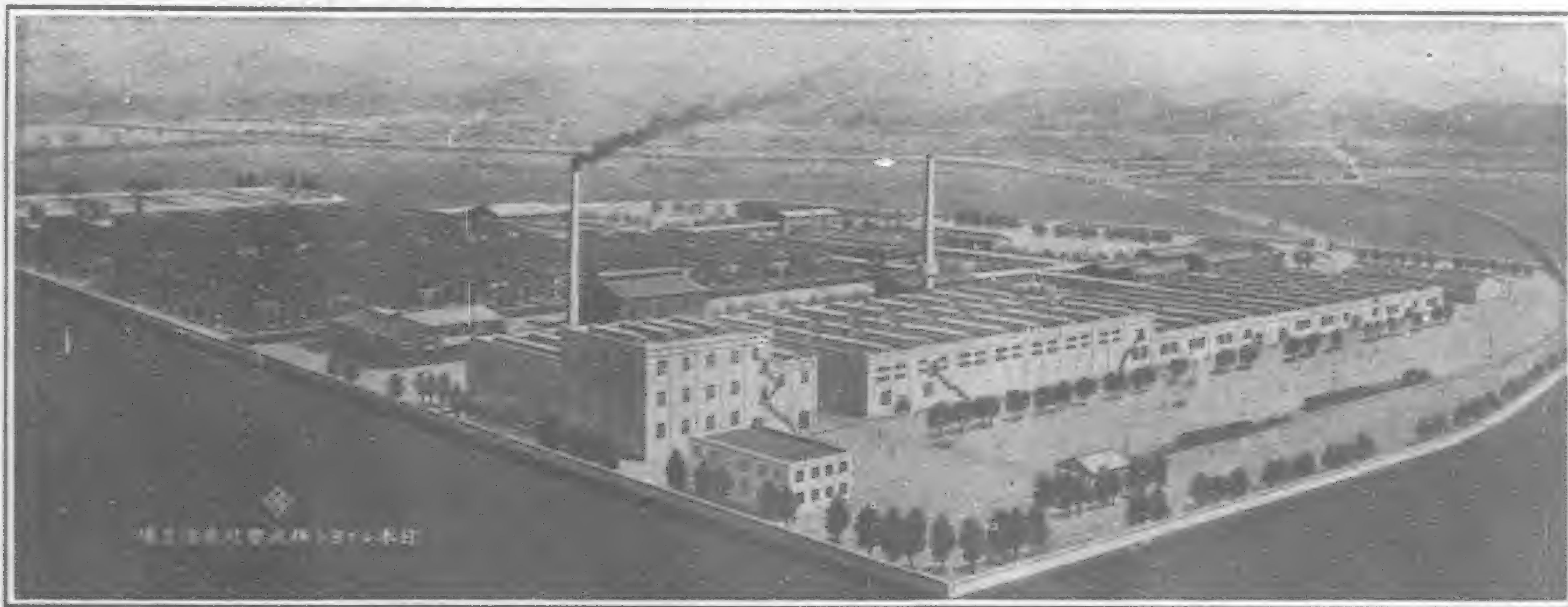
In 1925, Japan produced artificial silk to the amount of 3,000,000 lbs., of which 90 per cent. was produced by the Imperial Artificial Silk Co. and Asahi Silk Weaving Co. At the end of the year, the former company's Yonezawa and Hiroshima mills were extended so as to have double capacity.

The following table shows production, importation, exportation and consumption in the eight years ending 1925:—

Year.	Production. lbs.	Importation. lbs.	Total. lbs.	Exportation lbs.	Consumption. lbs.
1918	100,000	77,086	177,086	7,000	170,086
1919	140,000	75,716	215,716	30,000	185,716
1920	200,000	79,805	279,805	15,000	264,805
1921	150,000	137,739	287,739	5,000	282,739
1922	250,000	224,142	474,142	6,000	468,142
1923	580,000	1,006,609	1,586,609	5,000	1,581,609
1924	1,035,000	885,572	1,920,572	10,000	1,910,572
1925	3,000,000	831,099	3,831,099	15,000	3,816,099
1926	5,500,000	2,500,000	8,000,000	10,000	7,990,000

The above production and exportation and all the figures for 1926 are estimates.

It will be noted from the table that the consumption of artificial silk in Japan multiplied several fold in the past few years. In 1918, the amount was only about



Uji Factory of the Japan Rayon Company, Ltd.

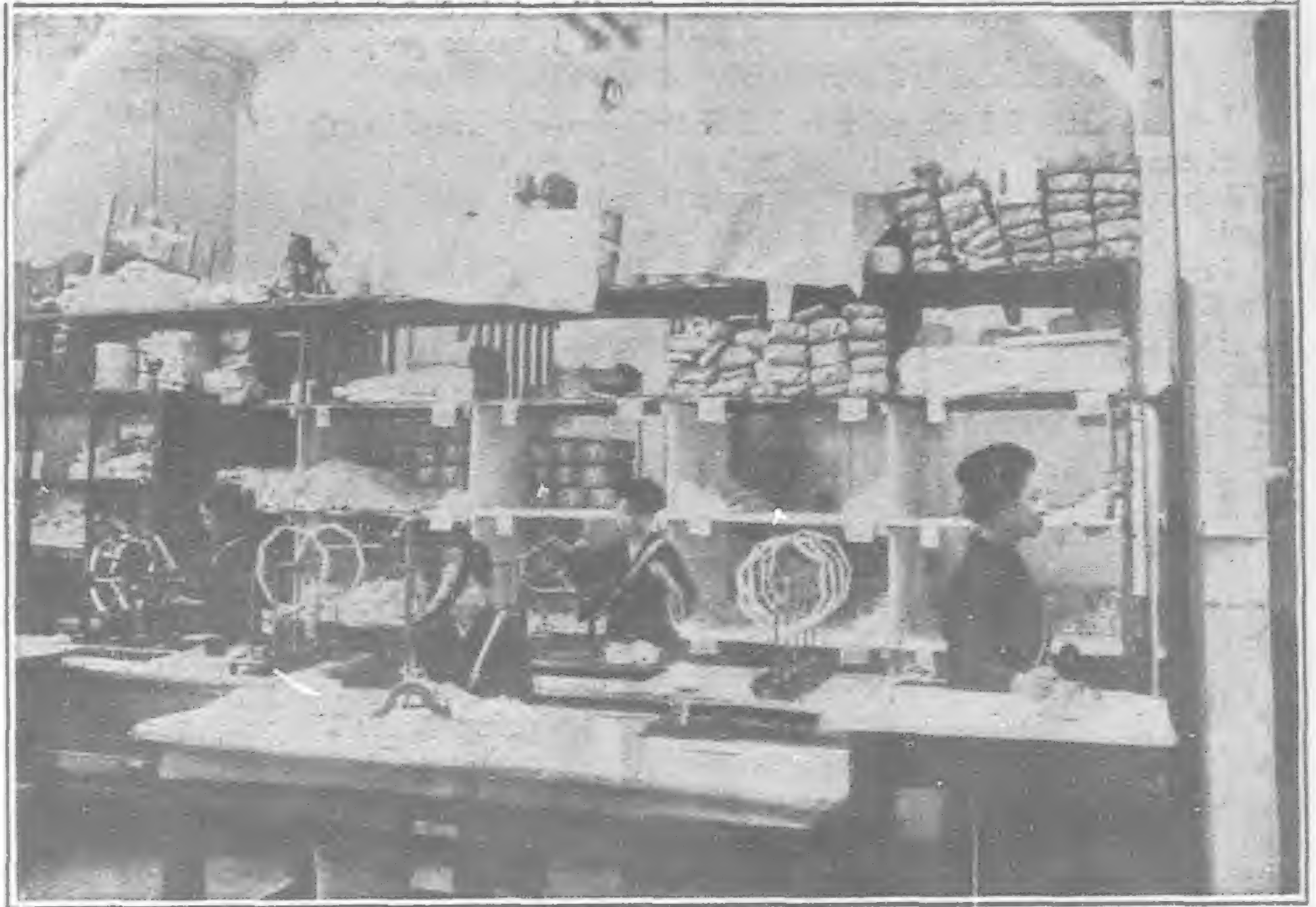
170,000 lbs., but it increased to about 470,000 lbs. in 1922. Subsequently, the figure rose much more markedly than before, and reached about 1,600,000 lbs. in 1925. This increased demand was aroused by the remarkable growth of production of the article here. In 1922, the production was only 250,000 lbs., but it swelled to 800,000 lbs. in 1923, to 1,500,000 lbs. in 1924 and to 3,000,000 lbs. in 1925, although these are estimates and do not represent the actual output. This increase in production prevented the importation of the article in a measure. In 1923, the importation stood at about 1,000,000 lbs., but in 1924, it fell off to about 900,000 lbs. and then in 1925, it decreased further to about 833,000 lbs. Therefore, foreign artificial silk does not retain its former predominance in the Japanese market.

The Imperial Artificial Silk Co. and the Asahi Silk Weaving Co. are the biggest of the mills in existence in Japan. The former had a daily capacity of 10,000 lbs. and the latter that of 3,000 lbs. in March, 1926. Besides, the Tokyo Artificial Silk Mill had a daily capacity of 500 lbs., the Miye Artificial Silk Industrial Co. that of 200 lbs. and the Artificial Silk Industrial Co. that of 50 lbs. These totalled 13,750 lbs., making a yearly amount of 4,115,000 lbs.

The technique of artificial silk manufacturing has made steady advancement in Japan. The two biggest concerns have been able to lower their cost of production to 1.20 or 1.30 yen, nearly one-third of the market price. This is a very lucrative feature of the industry and is enough to attract the attention of capitalists at the present moment, when almost all lines of commerce and industry are unprofitable. In fact, there are several important projects in progress, while the existing mills all have extension schemes in course of realization. When these plans are consummated, which may be expected within a few years, artificial silk making will rank very important among the national industries, with an aggregate daily capacity of 74,000 lbs. which will make a yearly total of 22,200,000 lbs., the capital invested then amounting in the aggregate to Y.100,000,000 at least.

The following table which has been obtained from a reliable source, shows the extension and new projects under plan in the industry in July, 1926:—

Company.	Capital Paid Up.		Location.	System of Plant.	Estimated Daily Capacity.
	Nominal.	Y.1,000 Y.1,000			
Extension Projects :					
Imperial Art. Silk Co. ...	12,500	8,750	Iwakuni	Hiroshima	12,000 lbs.
Asahi Silk Weav. Co. ...	8,000	6,000	Nobeoka	German G.	12,000



Inspecting Room in an Artificial Silk Mill

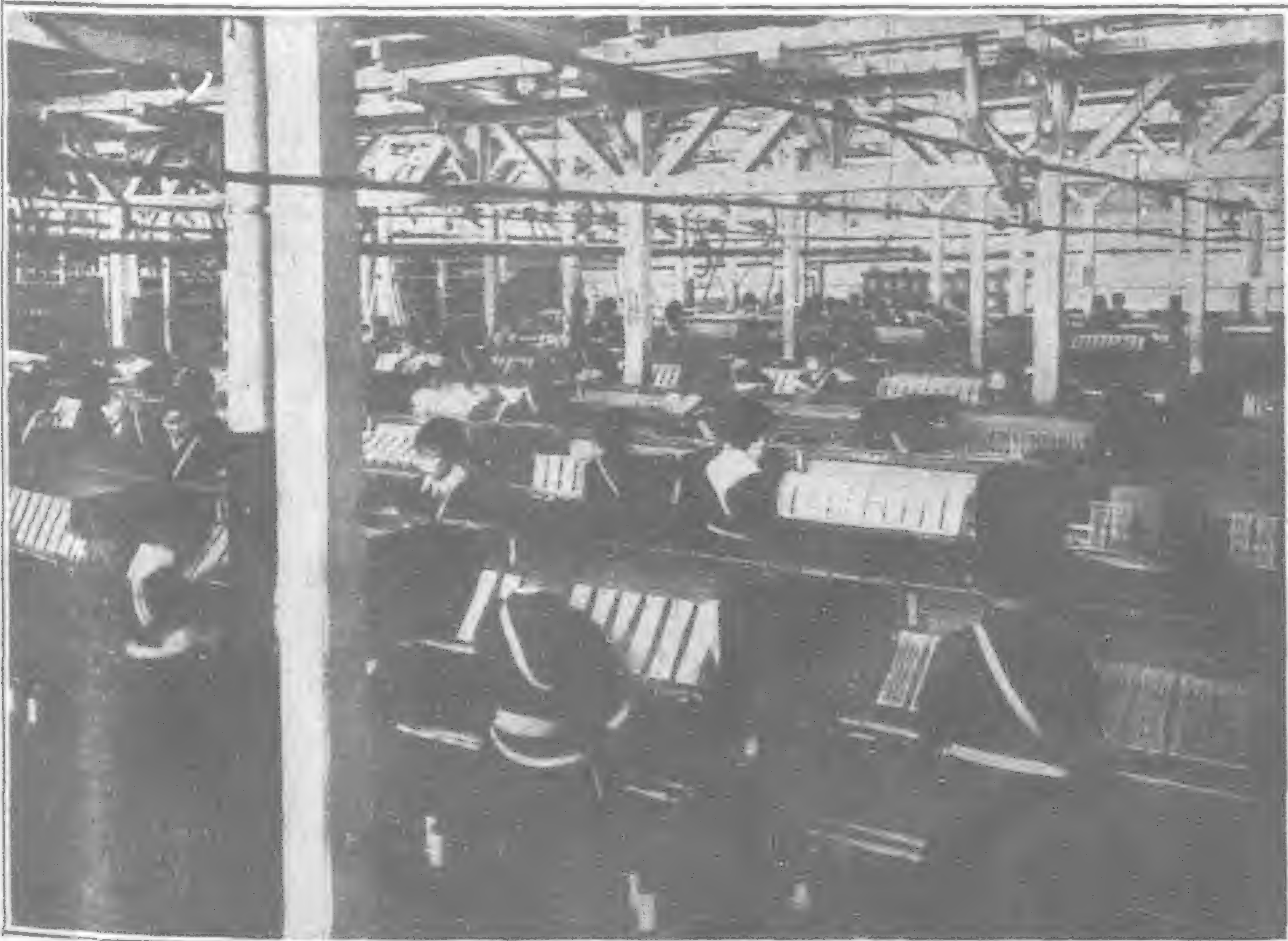
Company.	Capital Paid Up.		Location.	System of Plant.	Estimated Daily Capacity. lbs.
	Nominal.	Y.1,000 Y.1,000			
Tokyo Art. Silk Co.	10,000	2,500	Yoshiwara	" O.	5,000
Art. Silk Indus. Co.	3,000	1,500	Kawagoye	" "	1,000
Miye Art. Silk Indus. Co.	1,000	1,000	Matsuzaka	Suga (Japan)	2,000
New Projects:					
Oriental Rayon Co.	10,000	5,000	Ishiyama	German O.	6,600
Japan Rayon Co.	15,000	3,750	Uji	" "	4,400
Kurashiki Silk Weav. Co.	10,000	2,500	Kurashiki	" "	3,300
Oriental Spinning Co.	10,000	2,500	Katada	" O.	2,000
Japan Woollen Co.	1,000	1,000	Nagoya	Italian	1,000
Maruwa Weav. Co.	1,000	1,000	Maruoka	" ?	1,000
Imperial Explosives Co.	1,000	1,000	Takwtoyo	" ?	1,000
Gosho Co.	5,000	2,500	"	" ?	2,500
Total	87,500	39,000			52,000

Some of the figures mentioned above are estimates. All these mills will have the viscose process.

In addition to the above projects, there are some others planned by several big concerns, including Mitsubishi, Kanegafuchi Spinning, Katakura Silk Mill, Oji Paper Mill and Fuji Paper Mill Cos. These paper mills presumably project manufacturing pulp for artificial silk making and not producing the silk itself, which will be economically possible in a few years, with the great expansion of the industry.

When all the existing projects are carried out as planned at present, one authority calculates the daily output of the article in Japan will come up to 210,000 lbs., equivalent to 63,000,000 lbs. a year, in 1931. The figure does not include a certain proposed export artificial silk manufacturing plant, and when it is added to the above, the total makes 410,000 lbs. a day and 120,000,000 lbs. a year. This is nearly as much as the world's production in 1924 and would seem to be too large to be practicable.

The above-mentioned export artificial silk plant is planned by the Imperial Artificial Silk Co. with a capital of Y.100,000,000, which will be paid up by one-fourth every five or seven years, and five mills, each with a daily capacity of 40,000 lbs., will be built. The projectors estimate the world's future demand for artificial silk will ultimately reach about 2,000,000,000 lbs. a year maximum, of which China and India will require about 200,000,000 lbs., which they wish to supply, gradually enlarging their plant



Re-reeling Room in an Artificial Silk Mill

to a yearly capacity of 200,000,000 lbs. When this proposed company's capital is added to that of the other mills under project as above, the total makes Y.280,000,000.

All the artificial silk mills existing and projected in Japan use the viscose process, which is believed to do much towards placing the Japanese industry in an advantageous position in relation to the supply of materials in future. For the present, these materials are obtained entirely from foreign lands, but study in the technique of manufacturing them ought to find means for adequate supply in the interior. There can be no doubt, therefore, that the industry will come to hold a very close connection with paper mills in future.

Sites for the mills are being chosen mostly along the Uji River and Lake Biwa, the water of which well suits bleaching which is important for successful artificial silk making. Moreover, the place is close to large consuming districts and also to Kobe and Osaka, through which the goods may be exported conveniently.

In artificial silk making, like cotton spinning, the products are developing from coarse sizes to fine sizes. Certain artificial silk mills plan weaving fabrics, while certain cotton spinning mills purpose spinning artificial silk and a woollen manufacturing mill making artificial wool will use it in woollen cloth manufacturing.

The many projects existing are a cause of apprehension as to a future oversupply of artificial silk. In the event of all these projects being carried out exactly as designed, an oversupply will be inevitable in future.

The total output in Japan in 1926 is estimated by a reliable authority at 5,000,000 lbs., which will be quadrupled in 1928, when the first program of the present projects will have been carried out. If the situation in the industry should undergo an adverse change and it should become impossible to proceed with the programs, however, the above production will not be realized.

In connection with the future supply of artificial silk, Director Fujino of the Mitsubishi Paper Mills has recently published his estimate. In this estimate, he gives the total production as 5,000,000 lbs. in 1926, as 12,000,000 lbs. in 1927, as 34,800,000 lbs. in 1928 or 1929 and as 75,000,000 lbs. in 1930-1931.

The Asahi Rayon Company, Ltd.

The Asahi Rayon Company, Ltd., was organized with a capital of Y.2,000,000 on May 25, 1911. Prior to this, Messrs. S. Noguchi and G. Uye-hata now members of Board of Directors of this concern had been studying the conditions of artificial silk industry in Europe, with a view of introducing the industry into Japan. As a result, they approached Vereinigte Glanzstoff Fabriken A. G., one of the largest manufacturers of this line in Germany, and succeeded in taking over various patent rights for manufacturing rayon from the German manufacturers.

Subsequently the German manufacturers subscribed for one fifth of the shares of this Company, and at the same time accepted to send their experts to Japan to initiate the Japanese makers into the secret manufacturing methods.

The factory of the Asahi Rayon Company is located at Zeze on the Lake Biwa, famous for its beautiful scenery. The climatic condition, quantity of water available and nature of water are all suitable for this kind of factory. The construction works were carried out under the supervision of Dr. Meyer, engineer, and four other experts who had been despatched by Vereinigte Glanzstoff Fabriken A.G. for that purpose. Upon completion of the work on May, 1924, the operation was started. Though the output was small at the first stage of its operation, the manufacture gained so much public favor that they were unable to meet demands. With a view to extending the factory to meet with requirements, therefore, the capital was increased to Y.4,000,000 in October, 1924. In addition to the factory, the Company contemplate to establish another one on larger scale at Nobeoka, Miyazaki Prefecture. The work of the first stage is expected to be completed at the end of this year.

At present, the manufactures at Zeze factory comprise the five kinds of rayon, namely 90, 120, 150, 200 and 250 deniers, and each is classified into A.B.C. according to its quality.

The Head Office of this Company is located at Nishi-ku Edobori, Osaka. The Japan Cotton Trading Company, Ltd. is general selling agents for this concern with its branches in principal cities throughout the country.

Japanese Shipbuilding Prospects

THE Japanese shipbuilding industry had a phenomenal development under war conditions. Prior to 1914 there were in Japan but six private shipyards, with a total of 17 docks, capable of building ships of more than 1,000 tons. By 1919, the number of yards had increased to 57 with 157 docks, turning out a total of 622,000 tons for the year and employing over 100,000 workmen, or about four times as many as before the war. The world-wide glut of tonnage following the war, together with the ratification of the Washington Conference caused a steady decline in Japanese shipbuilding, from 437,427 tons in 1920 to 217,220 in 1921, to 59,000 in 1922, to 64,000 in 1923, to 66,200 in 1924, and to 55,355 in 1925.

The president of the Yokohama Dock Co. has recently commented upon the Japanese practice of purchasing old foreign ships. Such transactions have greatly increased since 1921, and it is said to be questionable whether they have in the long run proved more profitable investments than new ships constructed in Japan.

The most important private project now in prospect is the building of three new passenger liners for the N.Y.K., two of which will be built in the Mitsubishi yards and one in the Kawasaki yard, at a cost of about Y.31,500,000 (\$15,246,000), for which sum the cabinet has already approved a subsidy. The naval program approved by the present cabinet will, of course, help the Japanese shipyards, as it provides for the construction of 27 naval vessels, including four 10,000-ton cruisers, over a 5-year period at a cost of Y.261,310,000 (\$126,474,000). The budget for naval construction, as well as the subsidy of the N.Y.K. liners, has not yet been presented to the Diet, and since there is every prospect that the Government will have to dissolve the Diet and call for a new election, authorization of these expenditures may be postponed.

Net profits and dividends of 23 Japanese shipyards for the first half of 1926.

[In thousands of yen, each worth \$0.484]

Company	Paid-in capital	Capital and surplus	Net profit (per cent.)	Dividend (per cent.)
Nippon Yusen Kaisha	58,000	107,362	9.2	8
Osaka Shosen ..	62,500	85,072	6.6	7
Nishin Kisen ..	10,125	14,030	22.1	10
Kawasaki Kisen ..	20,000	23,255	—	—
Kiukai Yusen ..	10,000	10,447	9.6	5
Other 18 ..	43,173	38,856	5.4	—
Total ..	203,798	279,021	7.3	—

Rice in Chosen

(Continued from page 313).

with the object of making known to the public the area of lands capable of improvement, their location, the best methods for utilization, the estimated expenditure of the undertaking, its receipts and disbursements, and various other matters, according to the water facilities of each by examination of each field in succession, that the information may serve as a guiding principle for those undertaking the work. More than one-half of the plan has already been completed.

The subsidies granted to effect improvement of the lands will be made at the following rates of the cost of the work to be done:

1. Improvement of irrigation system for paddy fields ...20%
2. Conversion of lands into paddy fields ...25%
3. Reclamation of lands for conversion into paddy fields ...30%

A section was created in the Government-General with a view to exercising adequate supervision of such work and to enforcing the execution of the proposed undertakings.

The Government dispatches experts to districts in need to encourage and supervise the selection of seeds, increase in use of improved fertilizers and their proper application, the drying of unhulled rice and its careful grading, and various other farming methods.

The comparatively high rate of interest ruling in Chosen greatly affects the rise and fall of land-improvement undertakings, especially those needing long term investments, so the Government has appropriated funds to allow of its granting loans at a low rate of interest to those undertaking such enterprises.

Japanese Government Railways

It was not until 1869 that railway construction was seriously undertaken in Japan. In that year two short lines built with British capital between Shimbashi and Yokohama and Kobe and Osaka were commenced and opened to traffic in 1872 and 1874 respectively. Three years afterwards the latter railway was completed to the old

capital Kyoto. These lines were the beginning of the Tokaido line, now one of the main trunk lines of Japan. The gauge adopted was 3-ft. 6-in., which has become the standard gauge for Japanese Railways. In 1883 the first private railway was constructed followed by others in quick succession and in 1905 the mileage of private lines (3,232) exceeded the mileage of state lines (1,461) by 1,779 miles.

Realising the economic necessity of the improvement and extension of the means of communication a Railway Construction Law was passed in the year 1891 empowering the Government to construct new lines and purchase private railways. Given this impetus railway construction steadily progressed, and at the end of 1926 more than 10,000 miles of railway were in operation, chiefly under State control.

In 1906-07 the Railway Nationalization Program passed the Diet and led to the state acquisition of seventeen private lines representing 2,823 miles of the total private mileage of 3,248 for which 5 per cent. loan bonds were issued.

The purchase price of these lines was determined by taking the average rate of profit against the cost of construction for the previous six half terms and multiplying it by twenty times that rate multiplied to the cost of construction existing at the date of purchase and adding the price of any stores which existed. When, however, the cost of construction did not come up to the purchasing price determined in that way that cost was made the purchasing price and this arrangement was used for those railways which had been in operation less than six years.

Approximately 6,000 additional miles are planned to be laid down in the near future. This surely reflects credit on the progressiveness of the Japanese people so far as railway construction is concerned.

Construction

The mountainous character of the country necessitated a high degree of engineering skill and ingenuity in order to overcome the many formidable obstacles which presented themselves, and this fact, together with the large quantity of sundries traffic requiring transport goes in a large measure to justify the policy of a narrow gauge, despite the limitation of train speed imposed thereby. The maximum structure gauge, however, is as liberal as that obtaining on many standard gauge lines in other parts of the world. Train loads are generally in

the vicinity of 300 tons. Sleepers for the most part are made of chestnut, but pine and beech in the creosoted form are often used. The majority of the rails are of British manufacture weighing 75-lbs. per yard on main lines and 60-lbs. on branch lines. The maximum gradient is 1 in 40. There are twenty-five tunnels over 200-ft. in length including the Sasago tunnel which is over 15,000-

ft. long. Among the many bridges there may be mentioned that over the Akani river, which is 4,007-ft. long and over Tenrju which 3,967-ft. in length. The foundations for these bridges are cylindrical in shape made of brick with steel girders.



Banseibashi Station, Tokyo

Vice Ministers, made up of the Minister's Secretariat, Finance, Private Railway, Construction, Way and Works, Mechanical, Electrical and Traffic Departments.

The Railways themselves are divided into six grand divisions, namely, Tokyo, Nagoya, Kobe, Moji, Sendai and Sapparo, each in charge of a General Manager who is authorised to make decisions on all matters arising in the area under his jurisdiction. Only matters of a general and important nature are referred to the Central Administration for consideration.

Staff

At the end of March, 1924, there were some 190,000 servants in the employ of the Government Railways. The interests of the men directly concerned in the operation of the Railways, such as wage scales and conditions of service are brought to the notice of the management by the District Representatives of the employees who are organised for that purpose.

Free medical attention is given to servants who have sustained injuries in connection with their duties, for which purposes Hospitals and Dressing Rooms are maintained at all the large stations and workshops.

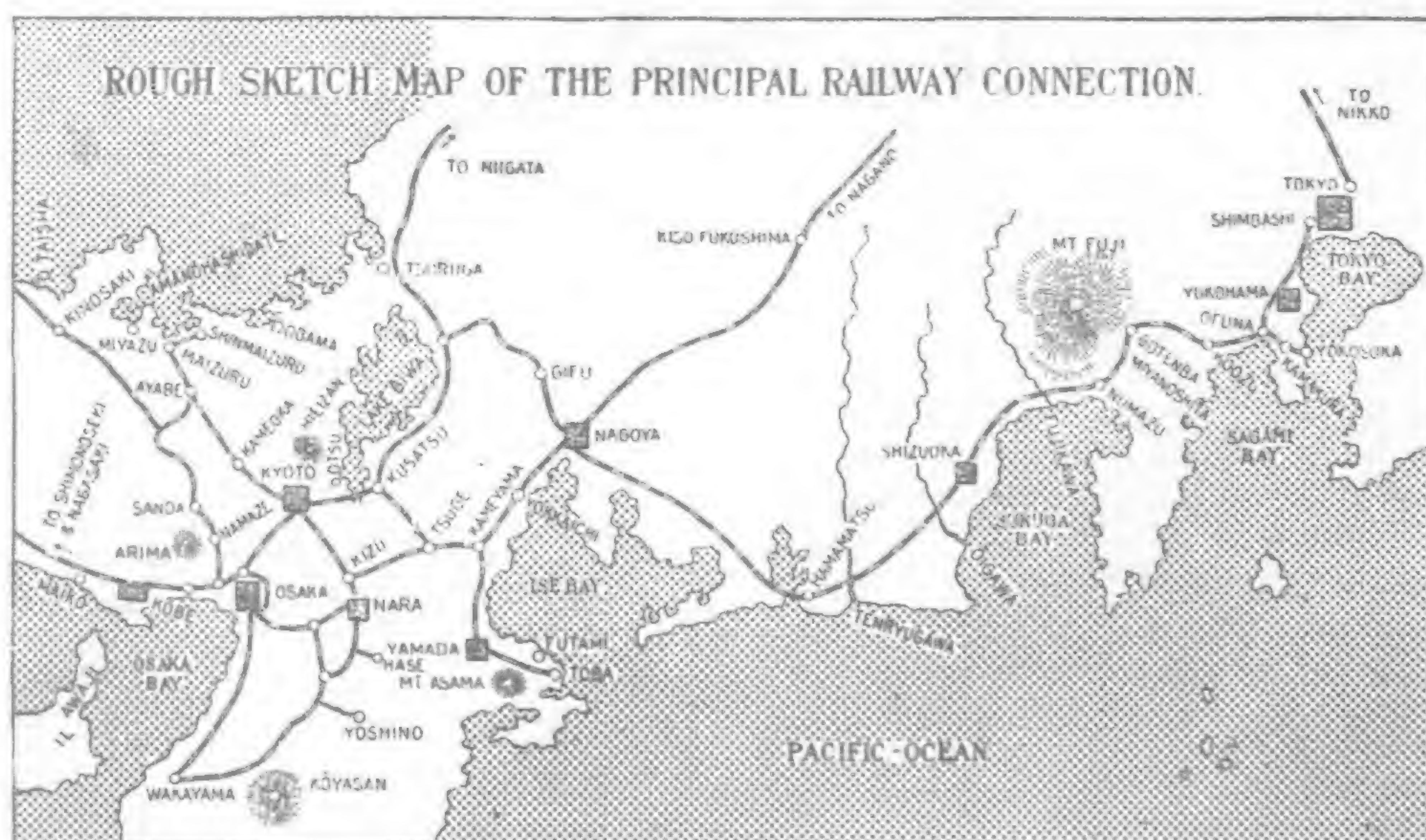
A Relief Association, established in 1907, and designed to give relief on the Insurance principle to members and families of the railway staff, continues to do good service. While, for the outdoor staff, membership is compulsory, approximately 92 per cent. of

the indoor employees participate, the former to the extent of 11 per cent. of their monthly earnings.

Provision is made for the training of railway servants in the subjects of Railway Business, Technical Work, Electricity, and English.

Finance

The Special Account Law, passed in 1909-10, provides for the segregation of Railway from General State Accounts, and for the raising of additional capital required



for construction and improvement purposes from revenue, and in case of loss, from the proceeds of loans or floating debts. The funds so obtained are earmarked: two thirds for the improvement of existing properties and one third for the construction of new lines.

Passenger Traffic and Accommodation

The distance from Tokyo to Shimonoseki—703 miles—is covered by express trains in about 24 hours. These trains run at an average speed of about 30 to 40 miles an hour, whilst local trains average 25 to 35 miles an hour. The majority of the trains are made up of second and third class cars, whilst first class sleeping and dining cars, serving both European and Japanese meals, are attached to the principal through trains. Though communication is maintained between each and every car on all classes of trains, the vestibule ends being kept together by laminated springs, thereby eliminating the possibility of the doors being wrenched apart. Observation cars are run on the Tokyo-Shimonoseki Limited Expresses so that the traveller and more especially the tourist may better enjoy the scenic beauties of the Land of the Rising Sun. The passenger guards and train boys on these trains speak English and render to the passengers whatever assistance may be necessary for their comfort and convenience.

The seats in the first second class coaches are longitudinal, and in the third class abreast. A new type of second class car was recently introduced with seats facing each other on either side of a central aisle and so arranged as to be easily convertible into a sleeping car. The coaching stock is of a simple and comfortable design, electrically lighted and steam heated. The passenger stock at the end of 1923 amounted to upwards of 9,000 vehicles, comprising 4,900 bogie carriages, 3,800 four-wheel carriages, and 500 trams and motor cars, giving a total seating-capacity of 460,000 or, about 50 per carriage. In this connection it is interesting to note that each car is fitted with a thermometer so that the proper temperature may be maintained. All passenger vehicles are fitted with automatic couplers, together with the necessary attachments for the operation of the Vacuum Brake, now being gradually replaced by the Westinghouse type of equipment.

To facilitate passengers in quickly finding the seats for which they have purchased transportation and minimising the time required for station duties, a coloured band, which is white for first, blue for



The Kobe Station at the Starting Place of the Line Tokai and the Sanyo, Kobe

second, and red for third class, tallying with the colour of the ticket issued, is painted below the window frames of each coach. In order to further minimise the time required for station duties two minutes before the departure of passenger trains, a bell circuit is closed, which serves to remind belated passengers that the train is about to start. Oral warning is also given in waiting and refreshment rooms.

Locomotives

During the earlier stages of the railway era in Japan locomotives were obtained from the United Kingdom, America and Germany, but the progressive Japanese soon began to devote their studies in this direction and are now turning out some very capable engines. A 2-8-2 type of freight engine was recently built at the Hiogo works of the Kawasaki Dockyard and Engineering Company, and it is interesting to note that with the exception of the Air Brake equipment, all the material used in the construction of this engine is of Japanese manufacture.

For express passenger traffic, engines of the 4-6-0 wheel arrangement are extensively used, whilst for fast goods traffic engines of the 2-8-2 type are coming into prominence. Very severe gradients are met with in many parts of the country necessitating a good deal of

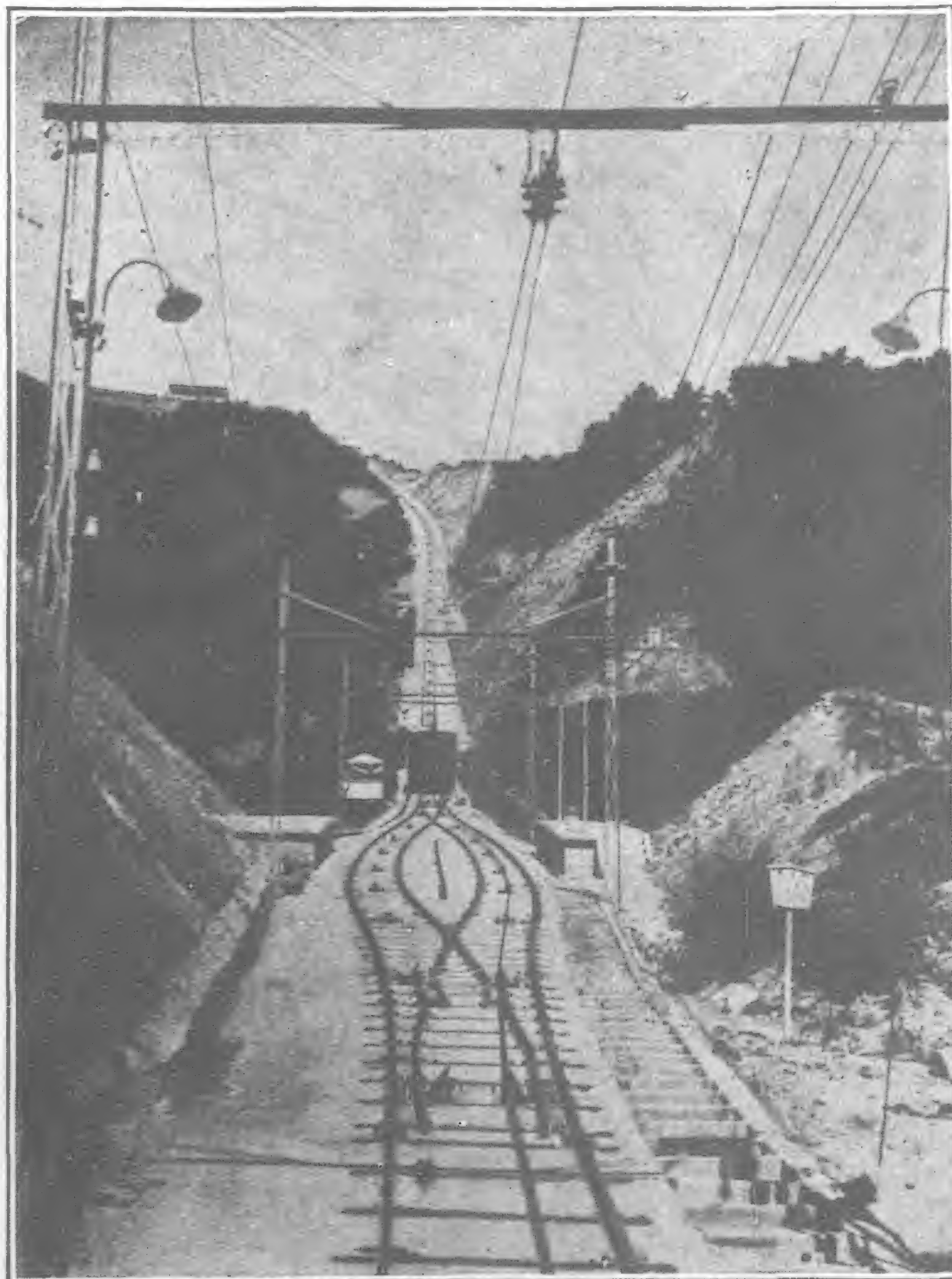
double heading and banking of trains. A number of Mallet engines have been in use for working the traffic over these stiff gradients, but owing to their high cost of maintenance they are being replaced by engines of simpler construction. On the trans-mountain expresses pusher engines are detached by the Brakesman while the train is in motion.

Practically all the locomotives (approximately 4,000 in number) on the Government lines are fitted with superheaters.

Workshops

There are some twenty-five workshops scattered over the Islands at which the construction and repair work is performed. The equipment is generally of the highest order as witnessed by the excellence of their productions.

Signalling on the Block system is well laid out, and adequate safeguards against accident are provided. On lines of high traffic density, and in and around Tokyo and Osaka, automatic and semi-automatic electrically controlled two and three position signals are being, and have been installed, thereby increasing the carrying capacity together with an added factor of



The Cable-car Running Along the Fine Views of the Mayasan, Kobe

safety. On certain sections, notably between Kobe and Osaka three position colour light signals have been introduced. On single lines Tyers Staff Tablet System is in use.

A large marshalling yard on the hump plan has been laid down at Tabata on the Yamate, North Eastern and Joban lines outside Tokyo. Concentration Yards are provided in the vicinity of all large cities.

It is interesting to note that all train tail and side lamps are lighted by electricity and that the spectacle of the tail lamp is surrounded by a red metal disc about 15 inches in diameter which greatly improves the visibility.

Electrification of the Usui Pass

In 1908 the electrification of the Usui Pass on the Shinetsu line was commenced, marking the initial adoption of electricity in Japan as an agent for electric traction purposes.

As originally opened in 1912 it was a single line railway worked by steam locomotives, but as the traffic increased it became evident that the existing arrangements were incompatible with the efficient and economical handling of the traffic and it became necessary to resort to electric power. It is one of the heaviest graded lines in Japan rising for seven miles at a mean rate of 6.7 per. cent., necessitating the adoption of the rack system for 5.2 miles.

Power is supplied by a steam plant furnishing current at 6,600 volts 25 cycles to two sub-stations, where it is transformed to 240 volts 6 phase and then converted to 650 volts direct current.

The electric rack locomotives in use at present are equipped with 330 h.p. direct current motors capable of pulling eight cars up the gradient of 6.7 per cent. for a distance of 5 miles at 11½ m.p.h. or nearly half the time formerly required by the steam locomotives.

Tokyo Suburban Lines

The idea of linking up the two main termini in Tokyo was first formulated in 1889. In 1905 the Central line electrified the City lines between its two termini, Nakano and Manseibashi, a distance of 8 miles. The overhead trolley system was adopted at a direct current voltage of 600. Electric automatic block system signals were installed at the same time. In the year 1918 the electrification of the Yamate line was commenced. The line, carried for the most part on elevated tracks, on leaving Shimbashi, describes a circle around the city and arrives at Ikebukuro, where a line branches off to Ueno. The main line continues to Akabane, 6 miles out of Ueno on the North Eastern line.

Subsequently the more noteworthy project, that of the electrification between Tokyo and Yokohama was commenced in 1912, and completed three years later. The line is operated at 1,200 volts d.c.

The rolling-stock on this line is composed of second and third class cars, including a number of composites and luggage and postal cars.

Between Tokyo and Yokohama, a distance of 19.2 miles, a 12 minute interval service of four and five car multiple



The Junction Station for the Train and the Steamer at the Wharf, Kobe

unit trains is maintained between the hours of 6 a.m. and 9 p.m. On the lines in the immediate vicinity of Tokyo a 3 minute headway is maintained. A new elevated section connecting Tokyo with Ueno was completed in 1925.

The metropolitan lines are supplied with power derived from two Government plants producing approximately 24,000 k.w. which is supplied to sub-stations at 11,000 volts high pressure by under-ground cables where it is transformed accordingly.

Electrification of the main line between Tokyo and Kobe, 353 miles, is now well in hand. The section between Tokyo and Odawara, 52 miles, including a

branch line to Yokosuka, a naval port, will shortly be opened to traffic. The power will be supplied at 1,500 volts d.c. and the existing Metropolitan 600 and 1,200 d.c. systems converted accordingly. The overhead trolley catenary wire suspension plan has been adopted. Forty-two locomotives are on order, thirty-four of which are being supplied by the English Electric Company.

The locomotives for passenger service have been designed to haul a train load of 315 tons at a speed of 55 m.p.h. whilst the freight locomotives are capable of pulling a 600 ton train at 40 m.p.h.

Investigations are now in progress with a view to the electrification of an additional 3,000 miles of trunk line railway, but owing to the uncertainty of obtaining a regular power supply for hydro electric generation, because of the long dry seasons and consequent lack of water, the execution of the work has been indefinitely postponed.

Stations

It is interesting to note that the majority of the smaller stations are built entirely of wood. The usual booking office, waiting rooms, luggage and parcels office, over-bridges or sub-way connecting the platforms being provided.

The station premises and buildings are kept in a spotlessly clean condition, which cannot fail but impress the traveller from abroad. Divers and Firemen all wear white gloves when on duty to prevent their hands being soiled.

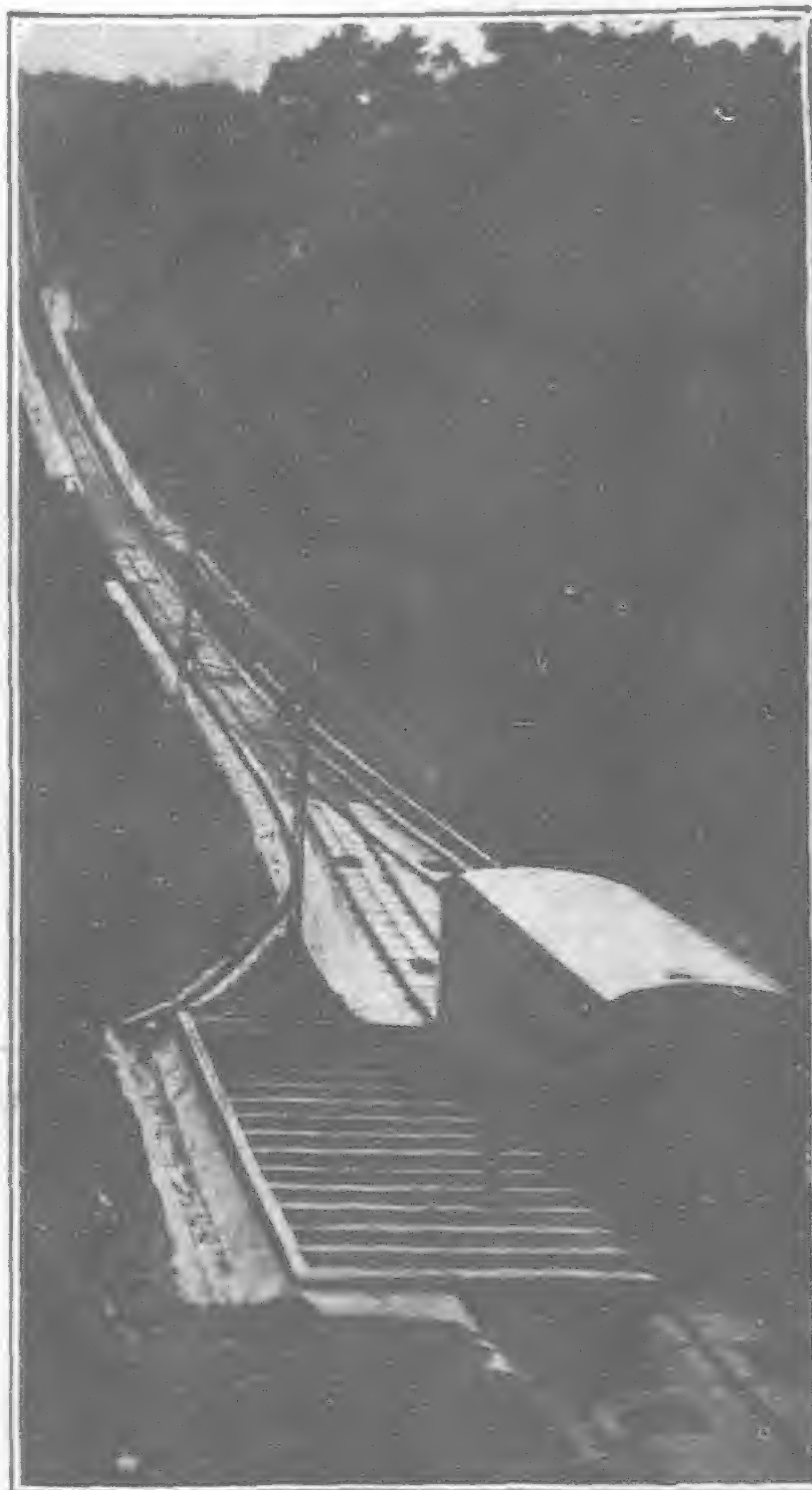
Telegrams are accepted for dispatch at all stations and on the more important express trains.

Blackboards are provided at certain of the larger stations enabling passengers to chalk up messages to passengers who are passing through later.

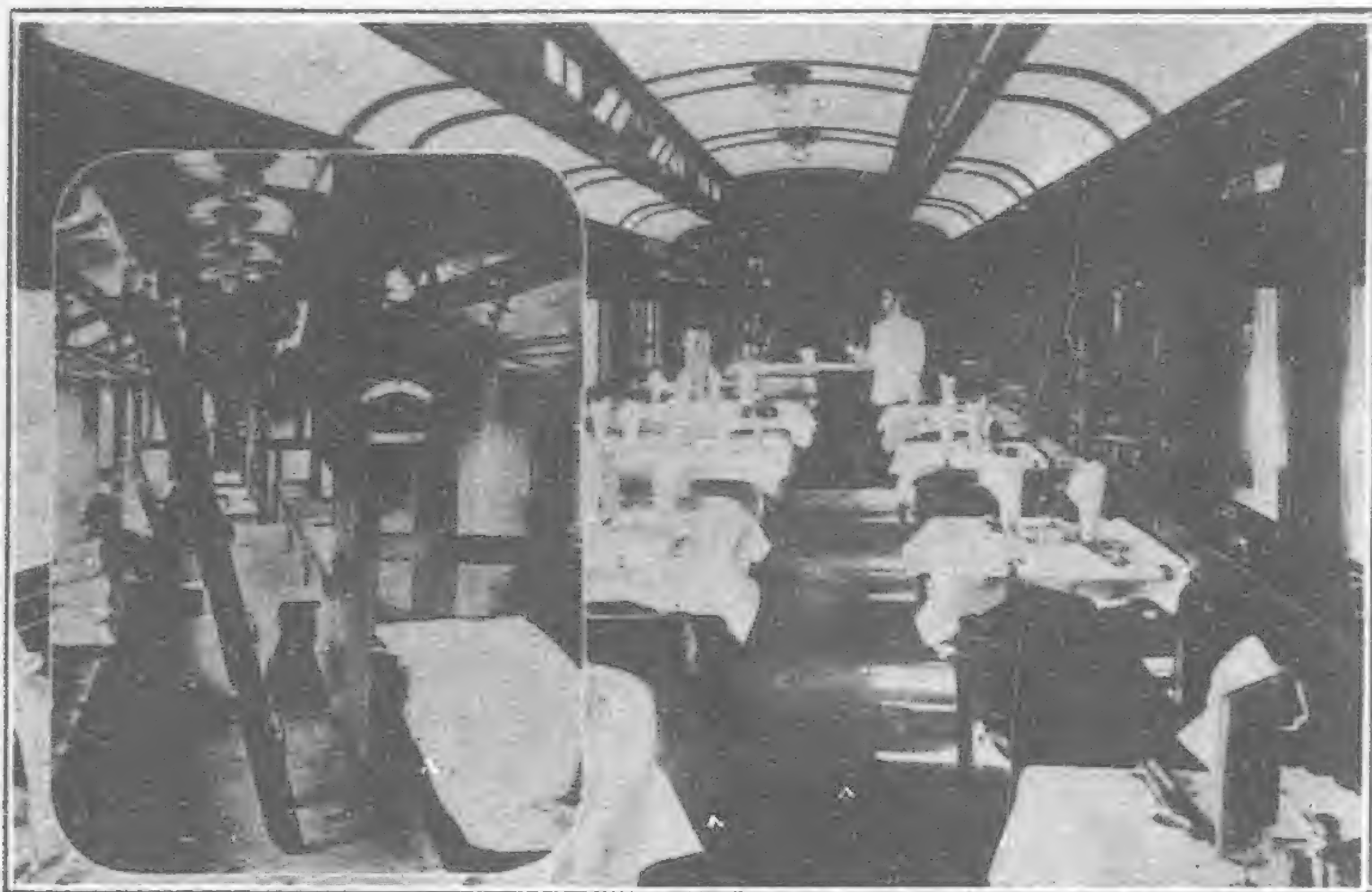
Passenger time tables are printed with the slow train shown on a white ground and express trains on a pink ground which enables passengers to quickly distinguish between the two kinds of trains.

Station name boards are painted so as to show the name of the station where they are located in large type and the names of the station on either side in small print with indicating arrows and particulars of the distance. This arrangement enables passengers to alight quickly at their destination. Enquiry offices are located at all the principal stations.

For passengers leaving stations, separate exits are provided, so that the conflicting streams of ingoing and outgoing passengers never meet.



Cable Car, Kobe



Sleeping and Dining Car Attached to all Express Trains

The cumulative effect of these details is to speed up the traffic generally and produces the fullest possible utilisation of rolling, stock and accommodation.

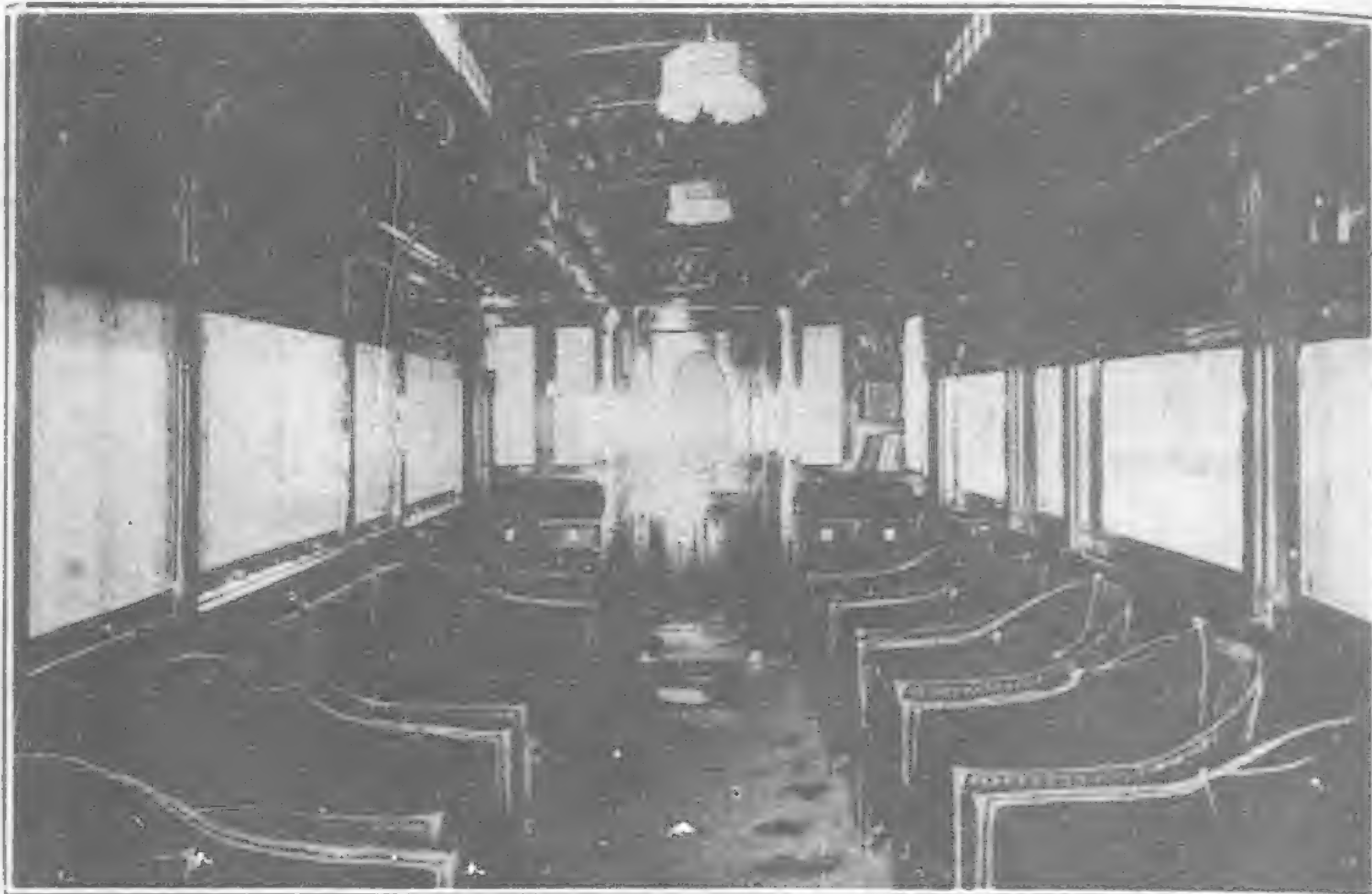
Signboards in English and Japanese also designate the chief points of interest in the immediate vicinity with distances and direction. In front of certain of the larger stations huge printed maps are hung which illustrate the location of points of interest served by the station.

Fare lists are pasted near the booking office windows and at large stations the usual train indicator is provided.

The love of the people for flowers finds expression in the display of pine trees, flowers, dwarf pots, hedges of plum, etc., at the countryside stations.

Tokyo Central Station

Special mention must be made of the Tokyo Central station. It is intended to make this a Grand Central Station with the main trunk lines radiating from it. The building is on the street level with the platforms elevated. Indeed all the tracks in the inner districts of the capital are elevated. One hesitates to think what might have happened during the earthquake in 1923 had they been below ground. The sidings for the coaches and engine sheds are on a lower level. There are four platforms, two for steam, and two for electric



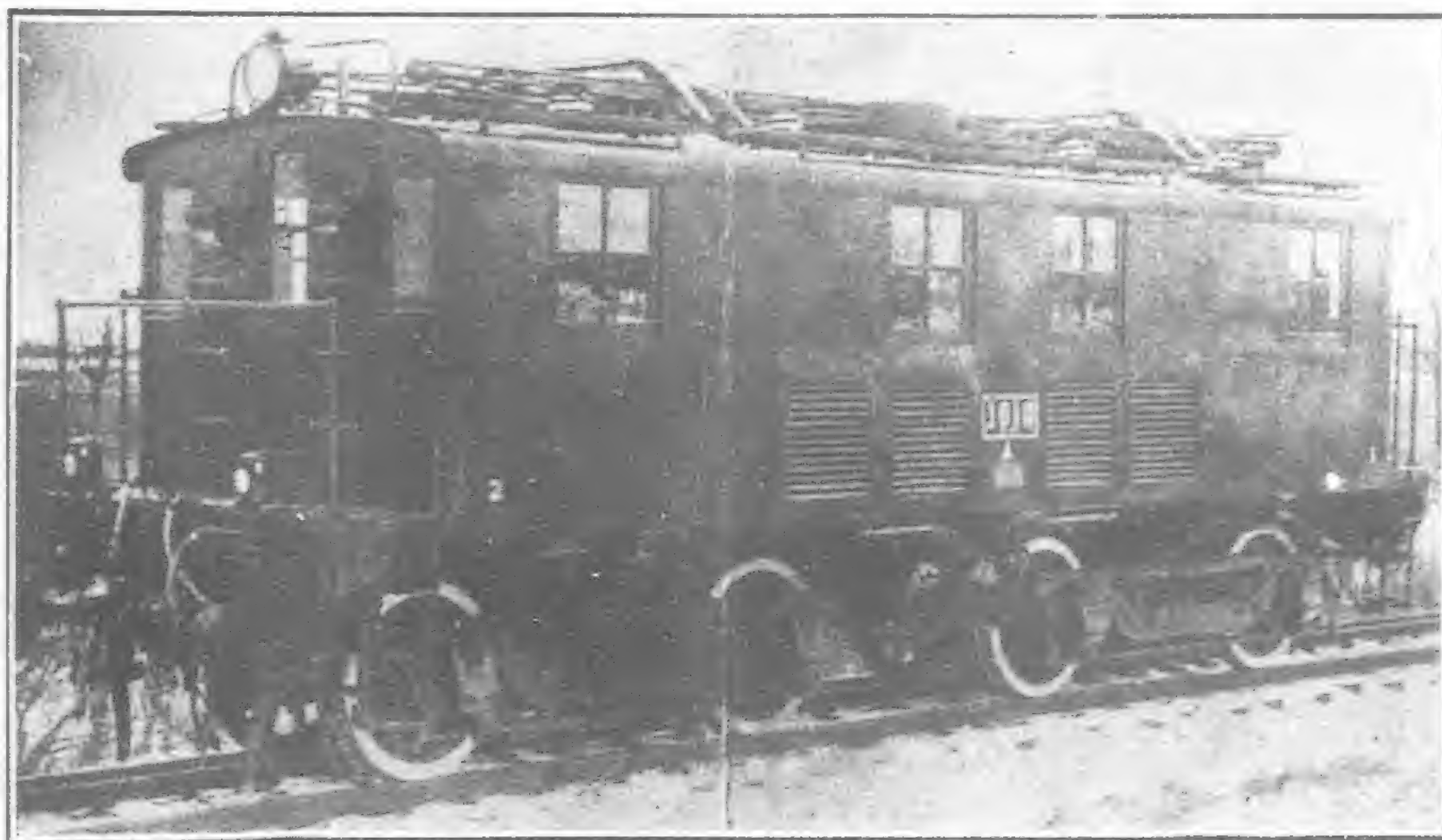
The Observation Car Attached to all Express Trains

trains, each platform track being duplicated, making eight tracks in all. The steam platforms are 774-ft. long by 30-ft. wide. Built in the Renaissance style the station is a very imposing structure.

Hotels

Adjoining the Central Station at Tokyo there is a railway hotel which is of a pleasing and comfortable design, and providing a first class cuisine it is rapidly making a name for itself. The Government Railways also operate hotels at Nara and Shimonoseki fitted with every modern convenience. The first named is built in the Japanese palace style and is situated midst picturesque surroundings. It is worthy of mention that all the principal hotels issue railway tickets.

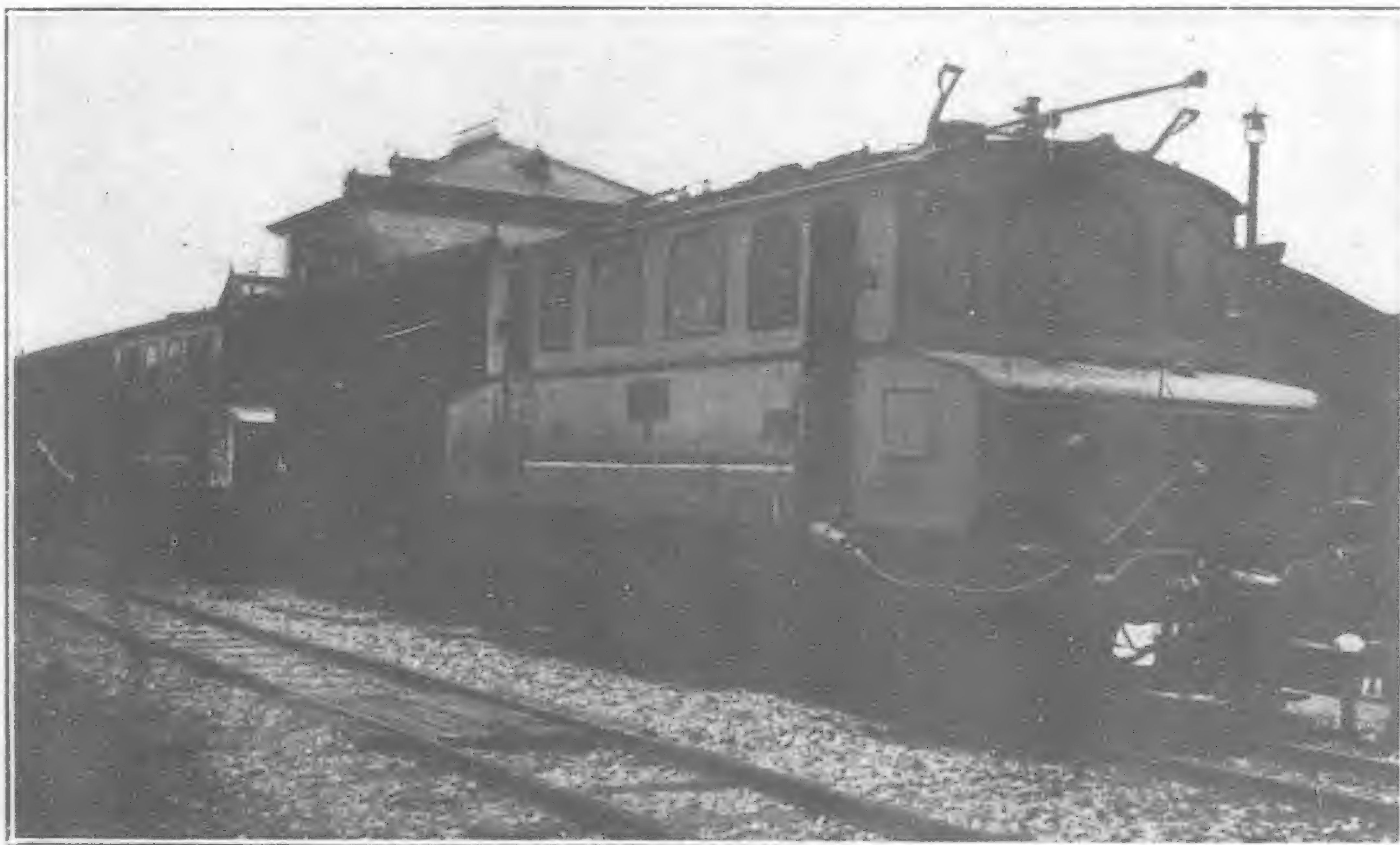
Restaurants, serving both foreign and native meals at moderate prices are established at all the principal stations.



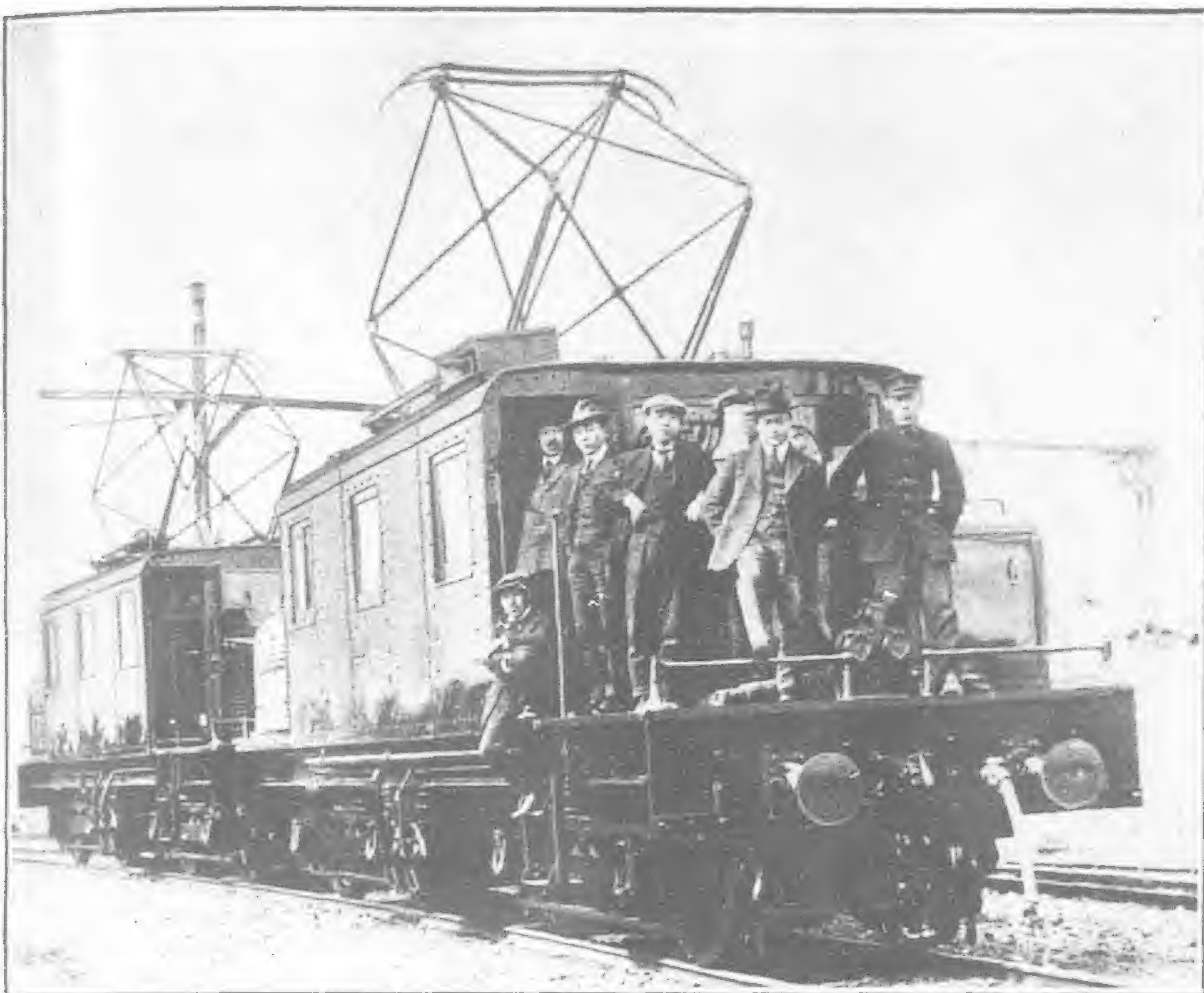
1,500 volt, 1,040 h.p. General Electric Locomotive for the Imperial Government Railways

Shimonoseki Train Ferry

Owing to the great breadth of the straits at Shimonoseki and Moji, and the frequent passage of ocean liners from and to the Island sea, a bridge is out of the question, although a scheme is now in contemplation to construct a tunnel. Barges specially constructed for the purpose are used for carrying the freight rolling-stock across the straits, thus linking up the Island of Kyushu with Japan Proper.



One of the A.G.E. Electric Locomotives on the Yokogawa-Karuizawa Section of the Shin-yetsu Line



A Baldwin-Westinghouse Electric Locomotive on the Chichibu Railway, Japan

Pontoons were erected at Moji and Shimonoseki, and under State control a station has been built at Moji and a landing place at Shimonoseki. About 8,000 passengers and 3,000 tons of freight are conveyed daily between the two points. There is a daily ferry service between Shimonoseki and Fusan, connecting at the latter place with the South Manchurian Railway. The interchange of commodities between Japan and Manchuria is increasing rapidly.

Altogether the Japanese Government Railways own and operate some sixty steamers, of which ten are allocated to the Shimonoseki-Fusan service. In pre-war days there was a special Siberian express from Tokyo via Shimonoseki and Fusan. The Government Railways also maintain a ferry service between Aomori and Hakodate,

and Uno and Takamatsu. The former service is maintained by three ships of 3,700 tons each capable of travelling a speed of 17 knots.

Through Traffic

Through traffic between China and Japan is growing rapidly, and as a result of annual Conferences between the delegates of the Japanese and Chinese Railways, the arrangements and facilities are gradually being improved and extended. There is a vast tourist traffic from Europe and America to the Far East, and the facilities offered for comprehensive tours by rail and steamer, with detours to places of interest, are much appreciated.

Ticket Agencies of long standing, and certain of the more important steamship lines are commissioned to sell tickets and to interchange rail for steamer tickets.

By reason of an agreement with the more important steamship companies, tourists holding tickets over the lines between Yokohama and Nagasaki or Shimonoseki may exchange them at par for tickets over the railways.

Improvements

A scheme is on foot to eliminate the long grades in the neighbourhood of Mount Fuji on the Tokaido Line by taking the railway around the coast via Atama.

At Osaka extensive improvements are contemplated to include a new passenger station and a low level goods station.

Between Kyoto and Kobe, one of the most congested districts, four tracks have been provided for the greater part of the distance.

The single track between Kobe and Shimonoseki will be doubled in the near future.

In the neighbourhood of Tokyo special goods lines and stations are planned to expedite the despatch and delivery of freight traffic.

The improvements mentioned prove conclusively that the Japanese Government is fully cognisant of its commercial responsibilities.

Electrified Subways for Tokyo

THE city of Tokyo has inaugurated a comprehensive program for meeting its traffic problems by the introduction of electrified subways. For the initial electrification, which will include ten steel cars, orders have been placed with the General Electric Company for motors and auxiliary equipment. Each car will be provided with two motors of 120-h.p. rating, the intention being to add subsequently two more motors per car, so that each may haul a trailer.

The subway construction is similar to that used in downtown New York; that is to say, all open cut, roofed over with steel, the tube being square, and located a comparatively short distance below the surface of the street.

The details which follow are quoted from the *Japan Advertiser*, a leading newspaper of Tokyo:

The construction of the first subway system in Japan, the most difficult engineering project ever undertaken underground in this country, which has been progressing between Ueno and Asakusa Parks since last September under the management of the Tokyo Subway Company, is now about half-way completed.

The link now under construction will be about one mile long and is part of a 14-mile scheme. The construction work is scheduled to be completed before the end of June, 1927, and passenger service is expected to begin the following August, after the subway is thoroughly tested by the Government.

The link will cost Y.4,500,000. It is reported that the subway is to be operated at first with 10 cars with a capacity of 100 passengers each.

"The construction is being done with the application of the best principles of such work in Europe and America," said Mr. Tokuji Hayakawa, managing director of the Tokyo Subway Company, Mr. Hayakawa is the first man who backed the construction of the subway system in Tokyo more than 15 years ago.

"On first thought," he said, "the subway for a country like Japan, where earthquakes of all magnitudes occur from time to time, seemed rather dangerous. But a careful study of various underground constructions in Tokyo following the earthquake of September 1, 1923, will dispel the fear. For instance, the tunnel connecting the Tokyo Kaikan and the Imperial Theatre, and another between the Yotsuya and Shinanomachi stations, on the interurban electrical train service, were not damaged. Underground constructions generally were not much damaged. Our subway is so constructed that it is seven times as strong as that of the Yotsuya-Shinanomachi tunnel and more than 10 times as strong as the tunnel connecting between the Tokyo Kaikan and the Imperial Theatre.

"The time will come when the people will realize that the subway is the safest place in which to take refuge during severe earthquakes. Also in time of air raids, which I hope Tokyo will never experience, there would be no safer place than in a subway."

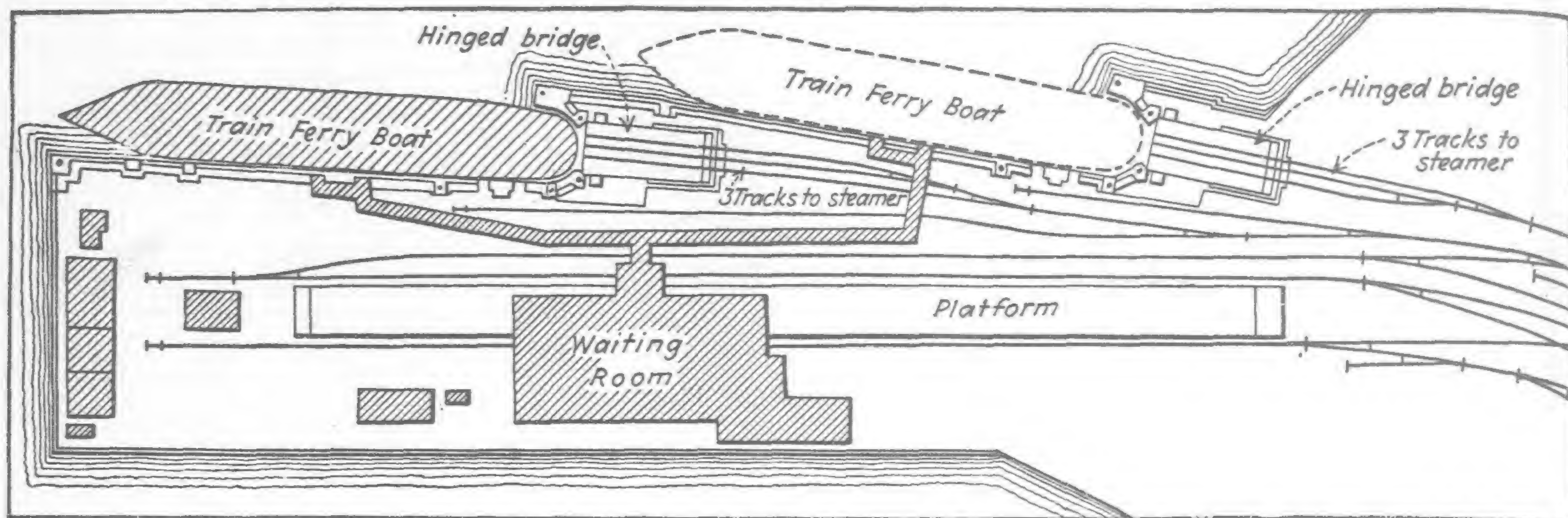


Fig. 2.—New Train Ferry Terminal at Hakodate

New Railway Train-Ferry in Japan*

Railways of Islands Connected by Train-Ferries Crossing Open Sea-Ferry Steamers and Terminals—Quay Walls

By M. Nawa, Engineer, Japanese Government Railways, Tokyo, Japan

IN the four main islands of Japan, the mileage of railway line operated in 1924 was 7,548 miles of the State Railways and 2,941 miles of private railways, or 10,489 in total. This is exclusive of lines in Chosen and Taiwan. The increase in freight traffic between the islands, the demand for lower freight rates and the necessity of prompt and punctual delivery of goods led to public opinion that train-ferry service should be established at least between the main islands.

In July, 1911, a car-ferry was established between Shimonoseki and Komorie (2 knots or 2.3 miles) to connect the islands of Honshu and Kyushu. In October, 1921, another was opened between Uno and Takamatsu (11 knots or 12.65 miles), to connect Honshu and Shikoku.

Through traffic by car ferry between the islands of Honshu and Hokkaido had been made very difficult by the long sea-route across the Tsugaru Straits and also by the fact that automatic car couplers were used in Hokkaido alone, screw couplers prevailing in all other parts of Japan. In July, 1925, car couplers were standardized by the adoption of automatic center couplers for the entire country. Ferry landings had previously built at both terminals, Aomori (Honshu) and Hakodate (Hokkaido), and the train ferry was opened to freight traffic as soon as the couplers were standardized.

The concrete of the arches and buttresses is 1:2:4, that of the footings about 1:2½:4½. Some of the fill behind the wall was brought in before the wall was entirely completed. The fill was compacted during placing by wetting it with a hose; after it had been brought up to the top of the wall and had settled for several months, it was again thoroughly wetted by jetting a pipe 5 to 7-ft. into the fill over the entire road area.

Thus, the ferry service between Honshu and the other three large islands, which make Japan proper, has been completed. The latest one between Aomori and Hakodate, covers 60 knots, or 69 miles, about 4.5 hours being required at sea and terminals.

Hakodate-Aomori Train Ferry—Four ferry boats have been built for this line, all of about the same type. Three are kept in service and one in reserve. They make four round trips daily. For the *Matsumae Maru* built by the Mitsubishi Shipbuilding Co., in 1924, the main dimensions are: Length over all, 360 ft.; beam, 22-ft.; molded depth to car deck, 22-ft.; loaded draft, 15-ft.; displacement, 4,250 tons; speed 17 knots. Six water-tube boilers

serve two sets of impulses turbines driving twin screws 11-ft. in diameter and 13-ft. 3-in. in pitch. Passenger accommodation is provided, equal to that on ordinary steamers, and the *Matsumae Maru* has capacity for 39,198 and 700 passengers of first, second and third classes, respectively, or a total of 937 passengers. In general arrangement, this train-ferry boat is similar to an ordinary ocean-going steamer, except that at the stern the superstructure is cut away to the level of the car deck.

At the stern, where cars enter and leave the steamer, there are three tracks of 3½-ft. gage on the car deck. The middle track extends only as far as the engine room, but the two side tracks extend well forward toward the bow. On each boat the total length of track is 674-ft. with capacity for twenty-five 15-ton cars, or twenty 15-ton cars and two brake-vans or cabooses of the bogie or doubletruck type. For safety, the boats are made double-bottomed, and each of the water-ballast tanks is divided into small compartments where the water

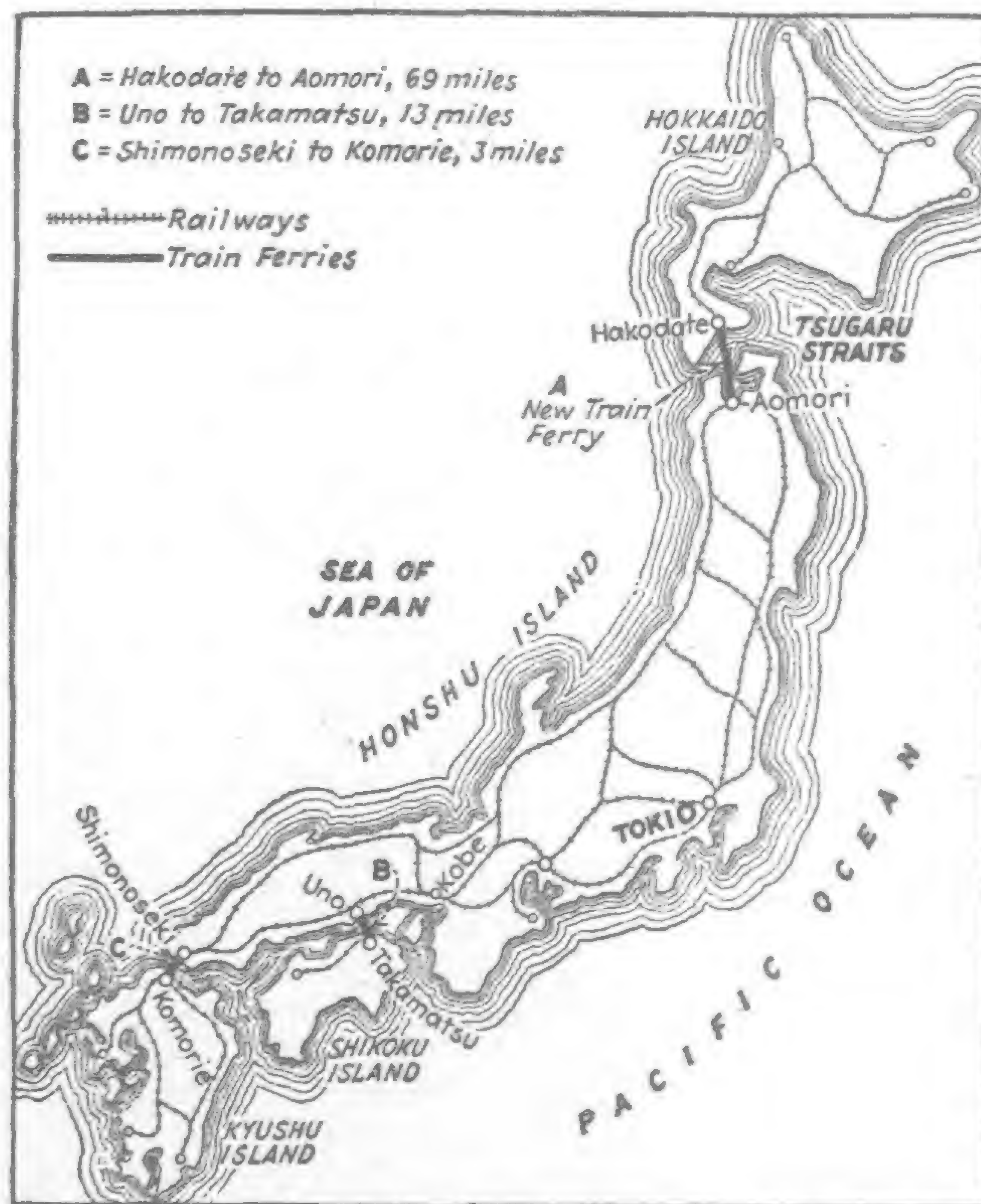


Fig. 1.—Train Ferries of Japan

*Engineering News-Record.

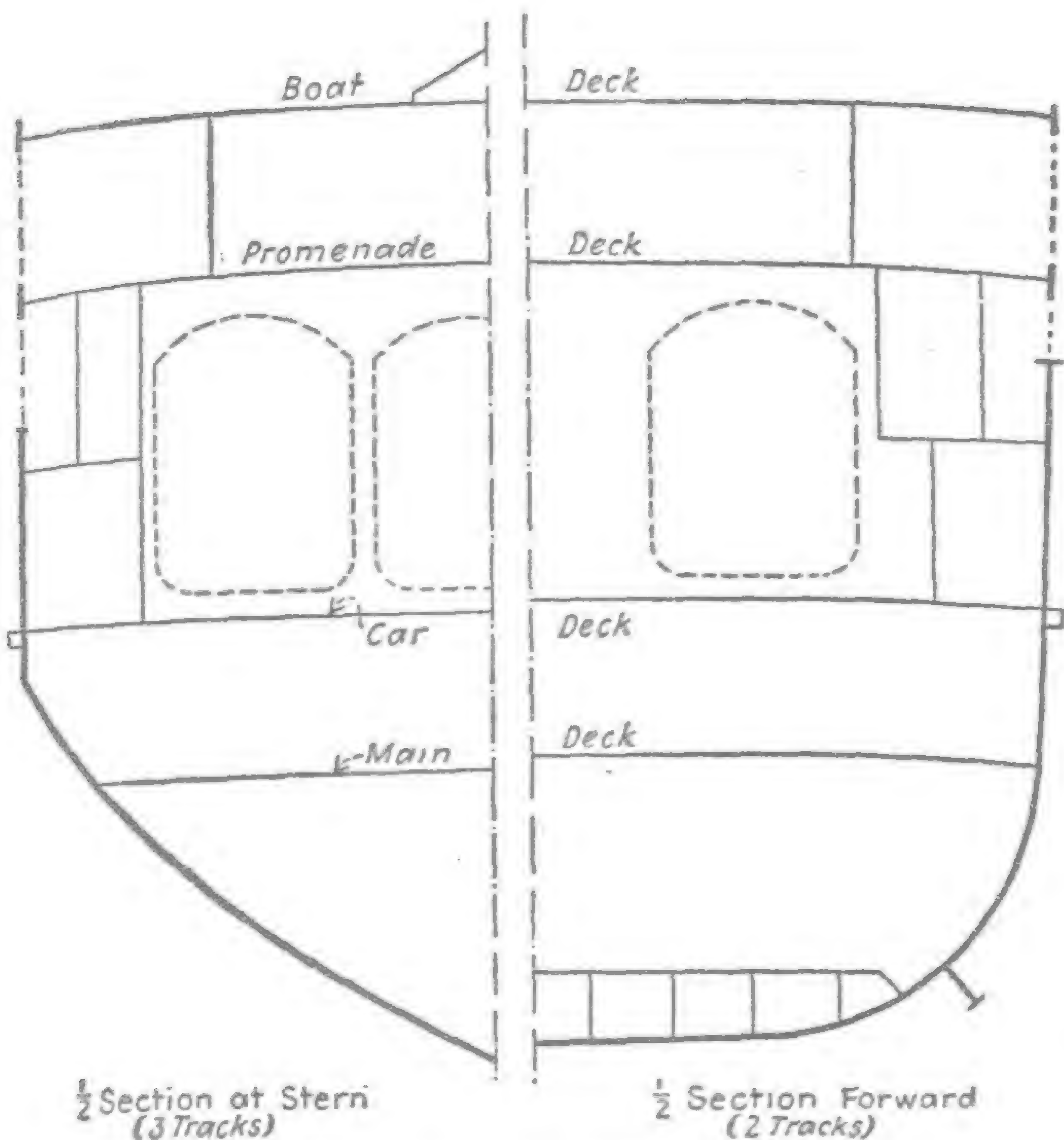


Fig. 4.—Section of Ferry Steamer

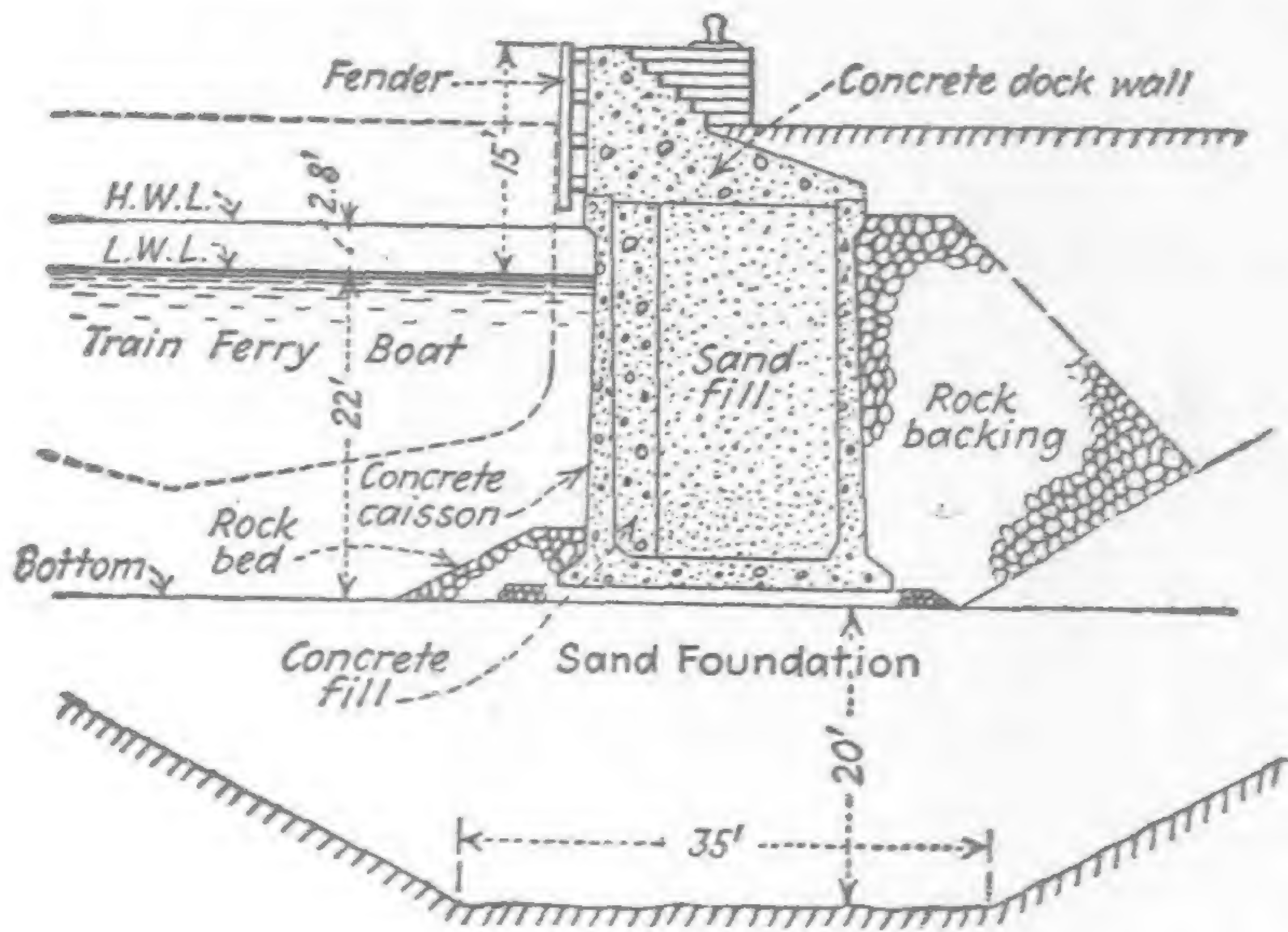


Fig. 5.—Quay Wall Construction

car deck. This bridge is raised and lowered as required by means of vertical screws driven by gearing and connected to the ends of the outer girders by eyebars. To balance the weight of the bridge, which is about 108 tons, cables attached to a cross girder pass over sheaves and carry counterweights. The counterweight sheaves and the operating mechanism, with 50-h.p. motor, are mounted on an overhead structure carried by steel towers.

At Aomori, there is only one berth at present, but another will be built before long. Here the quay walls are built partly of hollow concrete caissons, and partly of solid concrete blocks laid up like masonry, each construction being capped with a mass concrete wall.

is pumped in or out as required to maintain a constant draft. To provide against the heeling of the boat if more heavily loaded on one side, wing water-tanks are installed, each with a capacity of 140 tons of water. These tanks are served by pumps which enable the entire quantity of water to be removed from one side to the other in four minutes.

Rail-and-Water Terminals—At Hakodate there are berths for two boats alongside the mole or quay, which extends as far as the Hakodate station yard. For the convenience of passengers, covered walks extend from each berth to the waiting-room on the quay. This quay, has walls of hollow concrete caissons sunk in place on a bed of loose rock and then filled with sand, except that the waterfront side is reinforced by an interior wall of concrete. Upon these caissons is a superstructure or dock wall of mass concrete, and the space between the two lines of caissons is filled with sand.

From the track layout in the station yard, a lead track extends to each steamer berth and opens out into three tracks spaced to correspond with these on the vessel. To provide for the varying difference in level between the tracks on shore and those on the steamer, a hinged bridge is provided. This consists of 8-ft. girders 80-ft. long, carrying at the outboard end a hinged 20-ft. apron which seats on the stern of the boat's

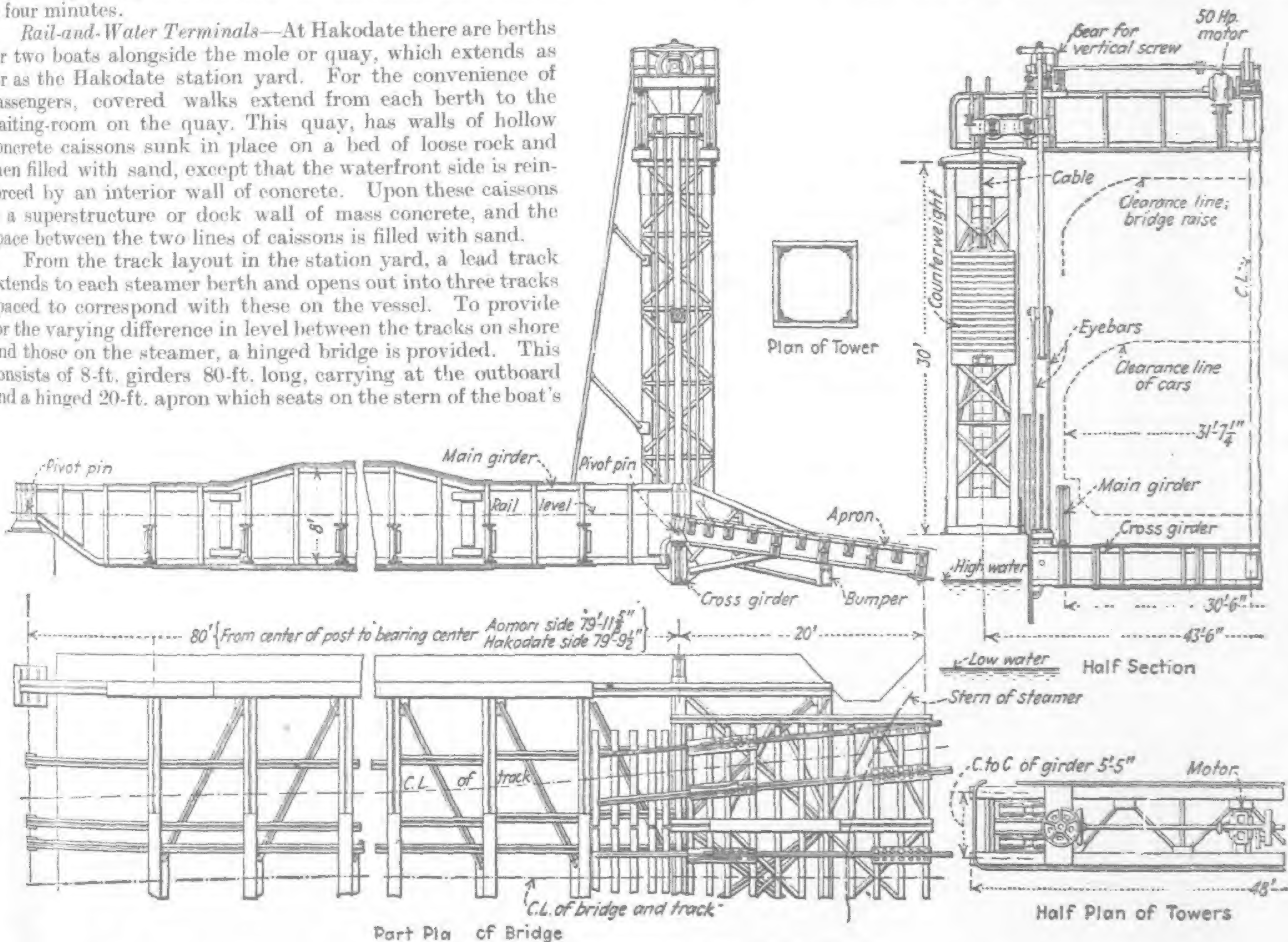
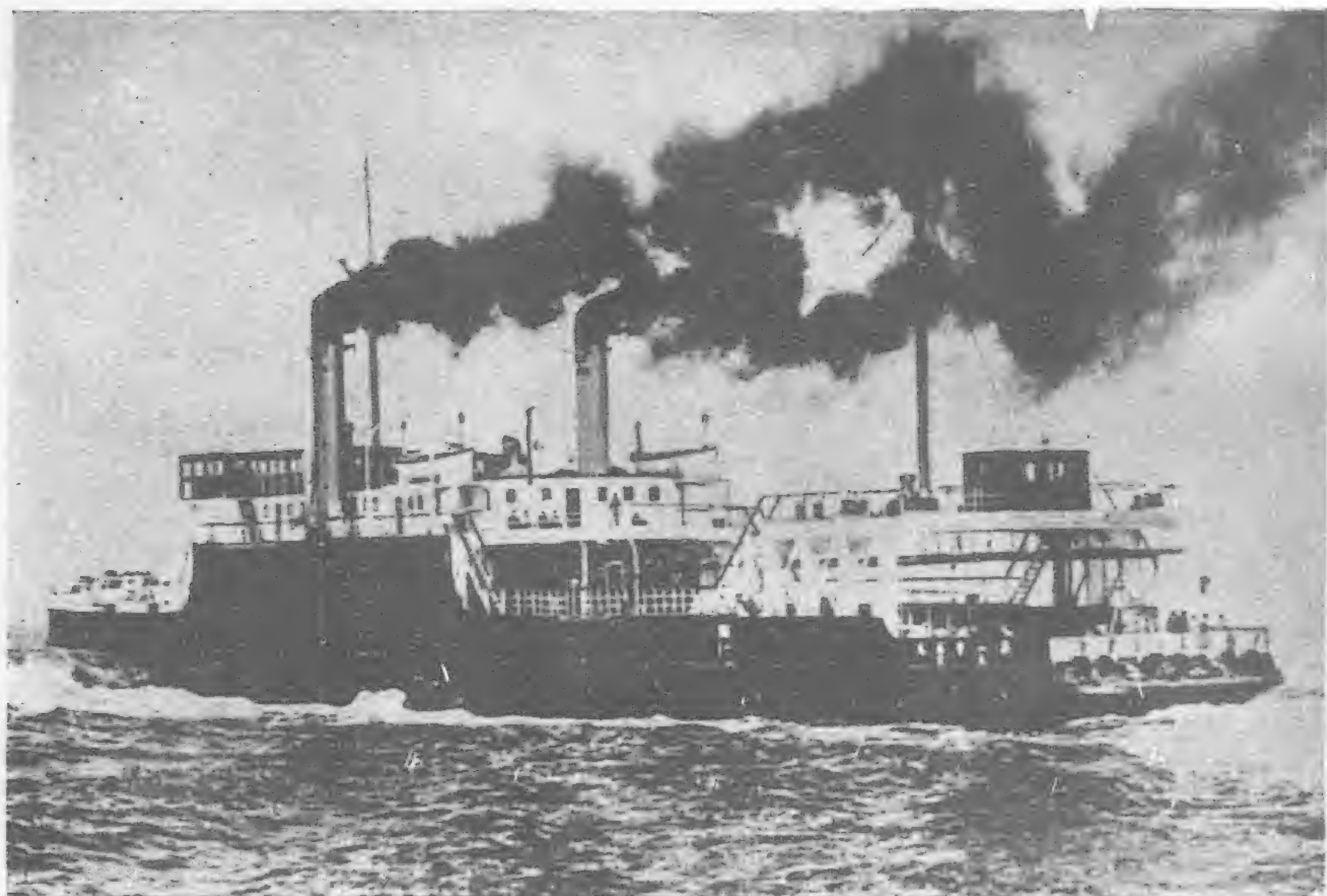
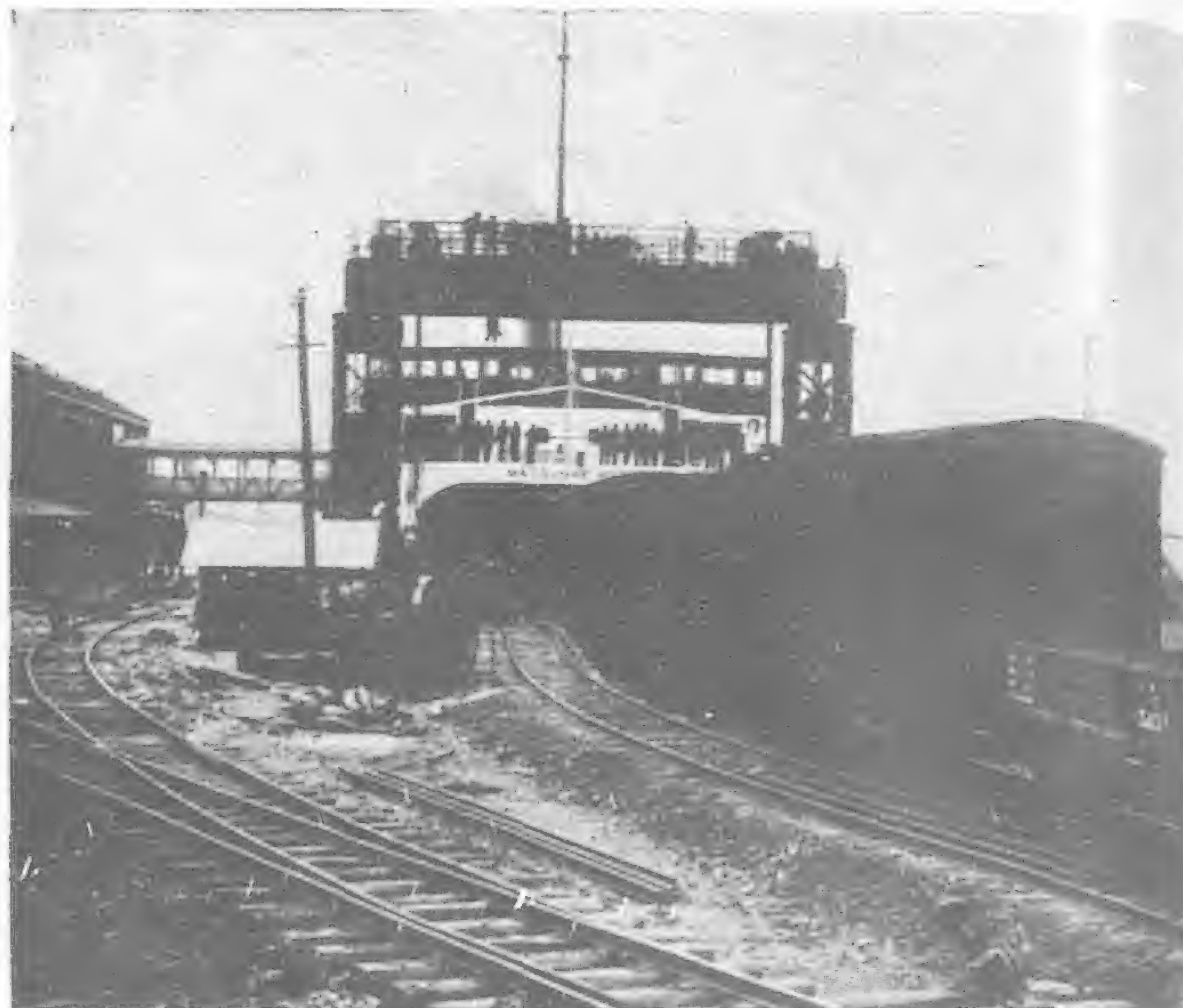


Fig. 3.—Bridge Connection to Train Ferry Steamer



Car Ferry "Seihan Maru No. 1." In Service between Aomori and Hakodate



The "Matsumae Maru" Loading Cars at the Hakodate Station Pier. One of the four Sister Boats in the Aomori and Hakodate Service

Gold Mining in North Manchuria

Aigun, Huma and Lopeh are three gold mining districts in Heilungkiang province, where the following mining companies are operating, employing a total of over 3,000 miners:—

Name	District	No. of Miners
Feng Yuan Gold Mining Co. ..	Aigun	850
Sin An Gold Mining Co. ..	"	200
Yung Ping Gold Mining Co. ..	"	200
Hung Yeh Gold Mining Co. ..	"	30
Teh Yuan Gold Mining Co. ..	"	240
Sui Cheng Gold Mining Co. ..	"	60
Ku Hsi Gold Mining Co. ..	"	70
Kwang Hsin Gold Mining Co. ..	Huma	200
Ching Kwang-chiu ..	"	250
Yu Hsin-kuo ..	"	100
Tai Ping Gold Mining Co. ..	Lopeh	500

Besides the foregoing concerns, which are financed by Chinese, there are a British and a number of American interests also working in those regions. The total output of gold during the last two years is reported to have dropped from 13,925 catties to 2,785-3,340 catties. The decreased production has compelled the mining companies to limit their working scope, while the total number of miners employed by the different companies has been reduced from 15,000 to 3,000. The Tai Ping Company, for instance, suffered serious losses last autumn owing to scarcity of output. It is estimated that if each miner procures 0.0536 ounces of pure gold a day, the company would make a moderate profit, but, if the figure drops to 0.036 ounces, the proceeds would be barely enough to cover expenses.

Generally speaking, the companies adopt the hydraulic mining process and use American style sluices. Occasionally, gold nuggets of notable size are obtained, although the bulk is obtained from the sand or in small particles. On the average, 2,785 catties of gold sand or ore yield about 0.1608 ounces of pure gold, but occasionally the figure reaches as high as 4.8 ounces of pure gold from the same quantity of ore.

The miners work about 250 days a year. They are paid either wage or contract rates. In the latter case, the foreman or contractor is responsible for the miners and also for supervising his work. The miner is required to sell all the gold he gets to the companies at the rate of 0.1072 ounces for \$3. This rate is, of course, much lower than the current market price.

At the headquarters of the mining companies, a number of armed guards are stationed for the maintenance of order as well as for the protection of the companies' property. They are usually detachments of regular troops and collect a tax on the companies' output. In the neighborhood of the mining camps, small market towns have sprung up to supply the needs of the miners.

Two of the more important gold mines in those regions are worth mentioning in detail. The Muerkan gold mine, which is situated at some distance west of Nungkianghsien, is operated by a Chinese company with a total yearly output of 139-167 catties of gold. The gold mine at Kilalin was formerly operated by Russian capitalists but is now worked by the Kwang Hsin Co. This claim, covering an area of a dozen square li, is located about 35 li from Shihwei. The total yearly output from this region in 1926 was estimated at 222 catties, of which 139 catties went to the Kwang Hsin Company.

The average total yearly output of gold from the different mines in Heilungkiang province is believed to amount to 3,340-3,584 catties, the bulk of which is produced in the mines located in the Heiho circuit. This figure does not, however, include certain quantities procured by poachers or unauthorised mine workers.

There is a touch of romance in the story of gold mining in the Heilungkiang backwood. About forty years ago, the rich gold veins at certain places in these regions were first brought to light. There was an immediate rush for the gold fields. Among the pioneer gold seekers, there were many coolies, unemployed miners, and adventurers from Siberia. Finally they all formed a sort of "republic" in the new territory. The mines held out such rich promises that there used to be a saying that gold could be obtained in lumps by simply removing the green turf from the surface of the earth. Many actually found themselves rich over-night. Both Chinese coolies and Russian adventurers greatly swelled the population of the "Republic," which at one time boasted 8,000 "citizens." The "Republic" was not amenable to Chinese jurisdiction, and the leaders or chieftains often took the law into their own hands. It is estimated that several thousand poods of pure gold were procured by the gold seekers before the "Republic" was suppressed by Chinese authorities. At present, although the "Republic" has been wiped out of existence, groups of private gold seekers are still frequently met with in those regions. They often organise themselves into groups of 20 or 30 men each and roam over the countryside in search of gold. A class of small shops have been opened in the neighborhood of Heiho to export gold, collected principally from this class of free-lance gold seekers.



S.M.R. Sulphate of Ammonia Factory at Anshan, South Manchuria

Manchuria Vitalized by Japan

Jules Sauerwein Tells of Her Success in Industry, but Inability to Colonize it.

By Jules Sauerwein, Foreign Editor of "Le Matin", Paris

WHEN considering the possibility of a war in the Far East one thinks only of Japan. She is the only power possessing the means to make such a war. It all depends on whether she would find a vital interest to take such a risk.

I am glad that the difficulties of my journey from Peking to Shanghai forced me to stop a day and a half at Dairen and half a day at Tsingtao. I believe I found here the answer to this question, which is one of the most important for the future peace of the world.

Japan during the last thirty - five years has made two wars in order to fortify and maintain her position on the Continent of Asia, besides participating in the great war.

In 1894-95 she victoriously fought China and by the treaty of Shimonoseki definitely established her supremacy in Korea. She also took the peninsula of Liao-tong, but returned the latter to China because she did not desire to remain in a

permanent state of hostility with her neighbor and also because of the friendly pressure of Russia, France and Germany.

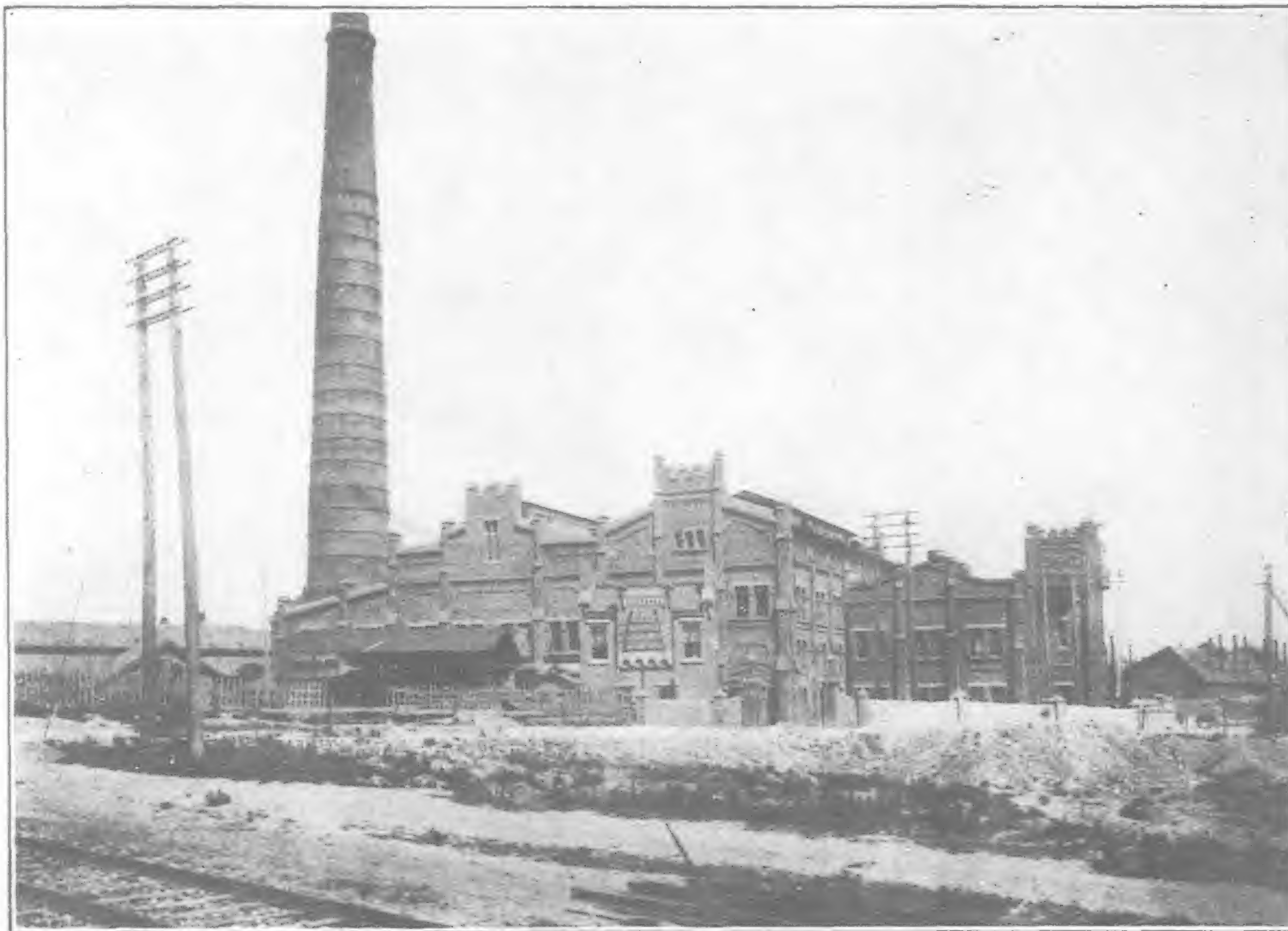
Countries Rewarded Themselves

Germany rewarded herself for her intervention by occupying Tsingtao and Russia by obtaining railroad concessions which were equivalent to the seizure of Southern Manchuria. Russian expansion was very rapid. Port Arthur became a formidable fortress. Finally,

in 1903, the Czar created a vice kingdom for Kouang-toung and Amour.

In the war declared less than a year later the Japanese victory was complete. Russia withdrew toward the north. Under the treaty signed at Portsmouth, N. H., on September 5, 1905, and supplementary agreements concluded in 1915 with China, Japan practically became master of this rich country.

I appear to be telling ancient history, but in my



Main Power House of the S.M.R. Electricity Department at Dairen

opinion these facts are highly up to date to-day. Yesterday I visited Dairen and its environs. When I am told that Japan has invested in Manchuria nearly Y. 3,000,000,000 (more than \$1,500,000,000) I can readily believe it.

Industry Due to Japanese

The magnificent network of railroads, coal mines in full activity hundreds of mills for the production of vegetable oils and excellent roads all prove the results of twenty-two years of Japanese effort.

The primary idea of Japan when engaging her forces on the Continent was security and the desire to prevent a great power from establishing itself opposite her on the coastline of neighboring Korea. The second was territorial expansion for a population increasing 800,000 yearly.

Regarding the latter aim, her failure has been complete. Baron Okura, director of the South Manchurian Railroad, told me that the population of 22,000,000 (this includes an increase of 10,000,000 during the last twenty years) does not contain 200,000 Japanese.

"One cannot compete with the Chinese coolie," said the Baron.

In order to understand his remark I need only look from my window. As I write Tsingtao dockers are busy unloading the cargo of the Sakaki-Marui, the steamer which will take me to Shanghai.

Coolies Joyous at Their Work

It is an astonishing picture. Four men with hooks pick up a bale weighing at least 250 pounds. A fifth man approaches with lowered head, receives the bale on his shoulders and carries it out on the docks. Their rapidity and agility are fantastic.

But most astonishing of all is their good humor. During the whole time the bale is arriving on the quay, is swung in the air by a crane, and as it disappears on a coolie's back the whole group sings a song with a swinging, joyous rhythm.

It would advantageously replace the desperately dull Russian song "The Volga Boatmen," by which habitues of the Montmartre usually express the monotony of their occupations. Occasionally a coolie makes a joke and all burst into merry laughter. I am no longer surprised. Nobody in the world can compete with men who labor from early morning until sundown without once stopping work, with such rapidity and good humor, whether it be in a tropical clime or 20 below zero, all for a scandalous wage of 20 to 50 cents a day, that is to say for five times less than a Japanese and twenty to thirty times less than an Englishman or an American receives.

Chinese Pour in by Thousands

So, as there is nothing to be done against the coolie, Manchuria under Japanese rule, has become a colony for Chinese. They generally arrived from Shantung in such vast numbers that in order not to overcrowd Dairen during certain seasons it became necessary to limit the landings to 12,000 daily.

Faced with the brutal truth of these facts, the Japanese Government was forced to find a new use for Manchuria. Finding here no new territory for colonization by their own surplus population and not wishing to quarrel completely with China by forbidding Chinese coolies to enter South Manchuria, the Japanese turned their activity toward industry, the production of raw materials which their own workers could later transform, and the production of coal to feed their factories.

In a measure they have succeeded. For example, the railroad is an excellent affair for the small Japanese capitalists, who originally subscribed out of patriotism. But if one must believe statistics I have just read in the *Manchuria Daily News*, success, as regards industry, is not so general.

Achievements Inspire Japan

Nevertheless, on the whole the moral and material advantages which Japan has drawn from Manchuria are considerable. The whole country is so proud of its achievement in this part of Asia that it would renounce its claims with as great reluctance as France, for example, would renounce her claims in North Africa.

If the United States should make a new proposal for neutralization like that made in 1909 by Secretary of State Knox it would be received with great disfavor.

Japan has many reasons not to seek war. She is suffering at present from isolation. She has been tried by terrible catastrophes. She is faced by an immense country, China, which Soviet Russia is attempting to organize along its own lines.

The present anarchy may be a guarantee of security, but only temporarily. If a Russo-Chinese alliance became a fact one of the first claims would be Manchuria. Meanwhile, the civil war is causing Japanese trade to lose sums which are beginning to reach \$12,000,000 to \$15,000,000 monthly, and in view of such an alarming future it is understood that the Japanese are highly anxious to learn the opinion of the two great Anglo-Saxon powers.

Washington Conference Blamed

Therefore, she will attend the naval conference in order to please the American Republicans searching for an election platform and in order to place the Asiatic problem on the table in a favorable atmosphere.

In any case Japan will not allow the creation of a hostile block of 550,000,000 Russo-Chinese without resisting with all her force.

Being convinced that the last Washington conference was largely the cause of the present Far Eastern troubles, I am persuaded that Japan will again attend the conference desired by Washington in order to try to repair the faults committed in the past.

The Government of Tokio consists of a patient Cabinet. They desire to carry all their trumps in their hands, knowing that they must play a hard game in the future. Besides, as the former naval disarmament conference has already cost them the British alliance and the rich German colony of Tsingtao, their next meeting with the Anglo-Saxons cannot cost them very much more.

Book Review

New Catalogs from U.S.A.

J. H. Williams & Co., Buffalo, N. Y., U.S.A., has issued a new catalog which contains so many changes and so much new and unusual information that editorial mention is made of the fact.

The new catalog (pocket size) carries practically all the goods shown in previous editions. In addition, however, there is shown J. H. Williams & Co.'s complete line of "Superrenches" (Chrome-Molybdenum steel)—in five patterns—all guaranteed against breakage. A great variety of sizes for Whitworth Standard and Metric Measure in both "Superrenches" and Carbon Steel Wrenches are described. Also "Superrench" Silent Salesman Display Boards and "Superreich" Sets. The catalog also features the new size of "Vulcan" Tongs, No. 15½ for 16-in. pipe. This new size makes it unnecessary to purchase the higher priced No. 16 "Vulcan" which is designed to accommodate 18" pipe, when pipe up to only 16-in. is to be handled.

Also, the design of their Light Service "C" Clamps has been revised, so as to provide a deeper throat with no sacrifice of strength.

This catalog also covers the new standard finishes for Drop-Forged Wrenches of Carbon Steel.

The New Finished Wrenches, which may be described as carrying "Maximum finish at Medium Price," have openings milled surface and edges smoothed, sizes stamped on heads, are case-hardened and black-enameled (baked on)—heads polished bright. Priced at the old *Semi-Finished* list, these new *Finished* Wrenches are the greatest value ever offered as a standard line. They replace J. H. Williams & Co.'s former Finished (Mottled color) and Semi-Finished Drop-Forged Wrenches of Carbon Steel.

The new Unfinished Wrenches are hardened and provide "Maximum utility with Minimum finish."

J. H. Williams & Co. are one of the leading manufacturers in the world, making Superior Drop-forgings and Drop-Forged Tools. Their products are found in every nook and corner, and users of their tools and dealers have expressed interest in being advised of the new developments and additions to this line. In view of this, you will want to carry a trade notice in your publication regarding the goods featured in this new catalog.

Making Iron from Beach Sands in Japan*

Titaniferous Magnetite to be Treated by Tokiwa Company, Using Thornhill Process

By James W. Neill, Chief Engineer, Tokiwa Company, Ltd., Kuji, Japan.

IN the foothills near Kuji, Japan, occur deposits of iron sand that have been known for centuries. Records of work done on them date back to 1650 A.D. From these deposits was obtained the iron for making steel for the celebrated Samurai swords, which, it is claimed, would cut through any other swords.

Kuji is a small town in Iwate Prefecture on the east coast of the island of Hondo about 100 miles south of its northern tip. It is 12 miles to the nearest railroad station, on a branch line which connects with the main line about 40 miles away. To the latter junction point traffic is usually routed. Roads are rough and hilly, and in the spring impassable.

Kuji Bay is two miles wide by two long, protected by sharp points of rocks from northeast and southeast storms but open to the Pacific otherwise. It is deep enough for 6,000-ton steamers, but they must anchor at some distance from the shore and cargo must be transferred to lighters and landed through the surf.

The deposits lie in the foothills about five miles back of the town, at an elevation of about 800-ft., and extend for about 15 miles along the foot of the higher hills. They constitute an ancient ocean beach, which has been elevated to its present location. The iron was originally deposited as a magnetite sand brought down by streams to the ocean from some erosion area in the mountains and distributed by wave and current along the ancient littoral. The Tokiwa Company, Ltd., of which Goro Matsukata is president, has prospected the deposit for some 15 miles in length. The greatest width thus far determined is 4,000-ft. and the average depth of minable ore about 10-ft., though in places the sands carry good values to depths of 75-ft.

These iron sands are deposited in layers of varying iron content, the best grade usually being at the top. They lie either upon the bedrock or upon other layers of sand and gravel of little or no value. They carry persistently a small amount of gold. The ore consists of magnetite grains, with much limonite derived partly from the breaking down of the magnetite, together with barren sand, pebbles, and in places boulders of fair size, all well rounded. The grains are very fine, practically all passing 65 mesh.

The limonite in the ore is also derived in part from the oxidation of the hypersthene, which is quite abundant in the original ore. The magnetite carries about 14 per cent. TiO_2 and the crystals of ilmenite (rutile?) are so minutely interlaced in the magnetite grains that crushing to 100 mesh fails to effect a separation. The limonite carries from 2 to 5 per cent. TiO_2 only. In the ground thus far developed the ore

carries about 35 per cent. magnetite, and this contains 40 per cent. of the total iron: the balance is in the limonite.

The overburden is sandy yellow clay, and is from 10 to 50 or more feet deep. The formation is only slightly inclined toward the ocean. Occasionally steeper dips occur where the bedrock is steep. Bedding of the layers is irregular, and shows indications of wave action.

Coal seams occur in the vicinity, usually below the heavy beds of cemented gravel; they carry beds of fair lignites from 2 to 4-ft.

thick, which have been extensively mined in the past and are now being developed vigorously, in the hope that they will ultimately supply the demand of the Tokiwa Company's reduction plant, amounting to 350 tons per day.

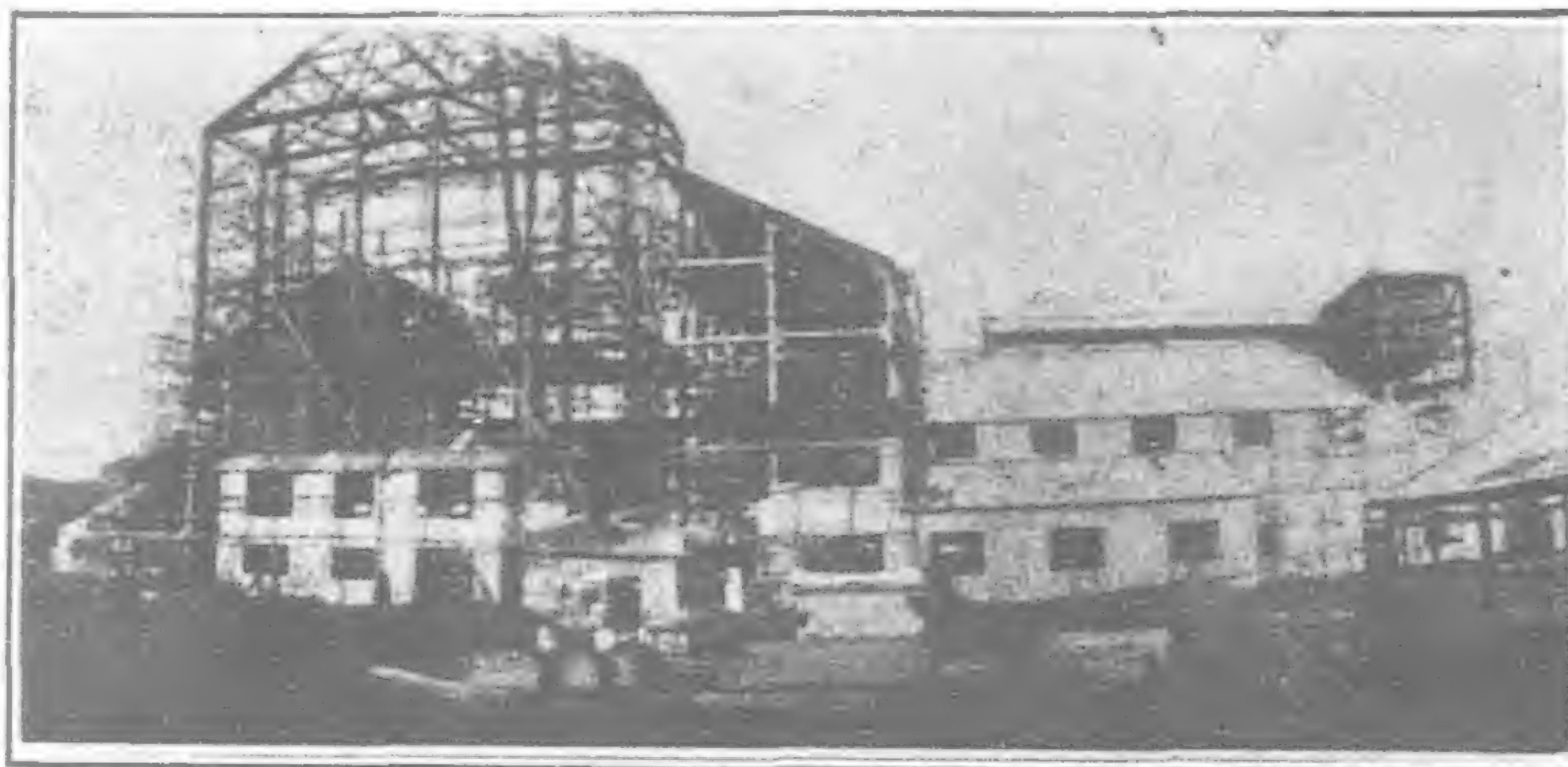
Elevation of the formation must have been rapid. It is cut by several deep gorges of the Osanai and the Kuji rivers. These canyons are evidently the result of fracturing during elevation. The original beach plain has been subsequently widely eroded, many small and large gulches cutting through it, the ore deposits being left on the

ridges only or on the benches connecting these ridges. The ore is deepest against the ancient shore line, and thins out toward the sea. Tonnage in the area prospected is large.

Owing to its being nearly horizontal and the overburden slight, the deposit might be mined by steam-shovel stripping and open-cut mining. Because of the high installation costs, however, and the smallness of some of the areas, and, above all, the necessity for selective mining, the Tokiwa company has decided to adopt underground mining. The system used will be retreating cover caving, for which the preliminary development has been laid out. The ore drills easily and most of it can be "augered." As the roof stands well, it is hoped to be able to recover much of the timber used. The first unit developed—namely, the Motoyama mine—is now ready for production whenever called upon.

Transportation Difficulties

No practical way appears for getting a rail connection between mine and beach direct. A wire-rope tramway also offers many difficulties and would be expensive. The older development at the Motoyama mine had included a narrow-gauge railway from below the mine in the Osanai gorge to near Kuji, connection between the mine and rail being made by a wooden chute. It was decided to use this method. The railway has been rebuilt to better grade and curvature and equipped with heavier rails and with gasoline locomotives. The connection will now be made by two short rail lines on the hill, and two chutes, one 130-ft.



The Tokiwa Company's Sponge Iron Plant, in Course of Erection, Near Kuji, Japan



Old Tunnel at Miznunashi. Above this is 40-ft. of Ore

and one 825-ft. long at inclinations of 41 and 42 deg. from the horizontal.

These chutes are 3 by 2-ft. and lined with steel plate. It is expected that they will play an important part in the breaking up of the lumps of ore and freeing the cobbles and pebbles from the iron sands. At the foot of the long chute, a "breaker" bin of concrete has been built, from which the ore is carried by pan feeder and belt conveyor to a 4 by 25-ft. revolving screen (with half-inch round holes) placed over a receiving bin of 250 tons' capacity. Here it is hoped to eliminate the pebbles, and save the crushing and haulage costs.

The Gorge line will take the ore to a storage bin at the mouth of the gorge, in small trains; thence it will go in 20-carload trains to the new plant at the beach, a distance of 5 miles. The haul is thus split up to help eliminate a steep grade at the entrance to the gorge, and at the same time provide storage against the contingency of rock slides in the narrow and rocky gorge.

To better the transport between ship and shore and *vice versa*, a new channel for the river has been dredged through the sand bar at the beach, but the volume of water in the river is insufficient to maintain this channel against the ocean storms, so that the operating company is now building a breakwater across the mouth to protect it from the waves, and hopes to be able in this way to maintain the channel. A canal has been dredged from this channel to the new plant, so that when all is finished barges can load and unload at the plant and proceed to the vessels in the harbour, effecting a great saving in time and insuring the necessary tonnage. In even fairly rough seas it is now impossible to land through the surf, and in the winter months it would not be possible at all.

If the iron contents of the ore had all been present as magnetite, the metallurgy would have been simple enough, as either wet gravity or wet magnetic separation methods would have been successful. The presence of a major percentage of the iron in the form of limonite, and the fact that this slimes completely in wet crushing, made it necessary to find some better method.

The fact that the limonite slimes so readily suggested the use of this method of separation, and a test was made by wet-crushing and tabling to produce a magnetite concentrate, followed by a desliming of the table tails, to produce a limonite slime. As a result of this test a combined concentrate was obtained carrying 35 to 45 per cent. iron, and from 65 to 75 per cent. of the total iron of the ore. This loss was too great to warrant the use of the method practicable

on the higher-grade ores, but the method will eventually be used on the lower grades to bring them up to furnace grade.

Wet magnetic separation followed by similar sliming was not as successful, and dry magnetic separation even less so. Tests were made to "magnetize" the limonite by heat and using carbon reduction. These gave promise of being successful, but the direct or sponge-iron process seemed the rational method, instead of the half-way step of magnetizing. Tests made in the United States on the crude ore and on the concentrates by the sponge-iron process gave surprisingly high results, recoveries up to 97.5 per cent. being obtained. From the sponge several heats of excellent steel were made in the electric furnace. It was decided to adopt this process, and the Japanese patents of Mr. Thornhill covering his furnace and method were purchased.

A plant containing two furnaces, each of a stated capacity of 35 tons of iron per day, is now being erected near the beach, together with a power plant of 1,000 kw. Under the process to be

used the ore is preheated in a MacDougall furnace to 900 deg. C. and then dropped on to the hearth of a reduction furnace, where it is mixed by stirring arms with sufficient carbonaceous matter to effect reduction. The necessary additional heat is supplied by burning producer gases in carborundum tubes carried on carborundum arches over the revolving hearth of the furnace. The reduced ore is dropped into revolving cooling cylinders, and thence conveyed to magnetic separators, which will produce a sponge iron carrying from 60 to 72 per cent. iron, together with about 14 per cent. TiO_2 , 6 to 8 per cent. SiO_2 , and varying quantities of magnesia, lime, and manganese. Sulphur and phosphorus are very low in the ore, though some of each will be added by the ash of the reducing coals. This sponge concentrate will be compressed under 30,000-lb. pressure to form briquets, without any binder, and these will be shipped to open-hearth furnaces for making steel. It is intended ultimately to melt these briquets on the spot in electric furnaces, but the necessary electric power is not now available.

The reduction plant complete will cost about \$1,000,000 and the entire investment will be nearly \$1,500,000. The company also owns a complete blast furnace and a coking plant, which are situated near this new plant. Two years ago the furnace was run for several months on the local ores, to demonstrate the feasibility of removing the TiO_2 by the blast furnace, and was entirely successful in so doing. It is possible that this plant may be used to melt the sponge briquets, and ship out pig iron, instead of the lower-grade material, thus saving freight and treatment charges and avoiding the national superstition against the presence of TiO_2 .



Upper Chute for Transporting Ore

Japan Makes Point Crossings.—The Daido Electro Steel Works, Ltd., of Nagoya, has succeeded in making good manganese steel point crossings, and will endeavor to produce them in large quantities, according to Consul H. T. Goodier, Nagoya, Japan. This will not only reduce the importation of such railway accessories from the United States and England, but it will enable Japan to export them to Chosen (Korea) and Manchuria.

Toho Electric to Have Cable For Nagoya-Nara.—It is believed that the Toho Electric Power Company intends to extend its business in Osaka. As the first means to realize the plan, the company has started laying a power cable between Nagoya and Nara, which will supply 77,000 volt current to Nara and vicinity.

The company has appropriated ¥4,000,000 for the cost of this new power cable.

The Present Financial Status of the Hanyehping Company

With a List of Outstanding Foreign Loans

THE Hanyehping Company is the result of amalgamation of the Hanyang Iron Works, the Tayeh iron mines in Hupeh province and the Pinghsiang coal mine in Kiangsi province. The Hanyang Iron Works was organised in 1891 by the late Viceroy Chang Chitung with a capital of Tls. 5,000,000 drawn from the Hupeh Provincial Treasury. In 1898, an additional Tls. 2,000,000 was raised from private capitalists to increase its working capital while the works were affiliated with the Tayeh iron mines and Pinghsiang coal mines to form the present Hanyehping Company, which is a private and Government joint enterprise. Later on more private shares amounting to \$17,000,000 were raised to increase the company's capitalization. The first foreign loan was contracted by the company in 1902 from a German firm, amounting to 4,000,000 marks. In the subsequent years, no fewer than 22 Japanese loans were contracted by the company between 1903 and 1924, which amounted in total to over Y. 57,000,000 of which about Y. 12,000,000 have been repaid. The following list shows the Japanese loans remaining outstanding:—

Contracted in :				Amount in Yen
April,	1911	...	...	12,000,000
February,	1912	...	...	3,000,000
June,	1912	...	...	300,000
November,	1912	...	...	500,000
November,	1912	...	...	2,500,000
—, 1913	...	...	...	9,000,000
—, 1913	...	...	...	6,000,000
July,	1913	...	...	500,000
April,	1915	...	...	150,000
April,	1915	...	...	150,000
September,	1917	...	...	1,250,000
—, 1919	...	...	...	1,250,000
—, 1924	...	...	...	8,500,000

The assets of the company are estimated to be worth over \$52,000,000, and may be enumerated as follow: Tayeh iron mines, No. 1, valued at \$9,370,637; Tayeh iron mines, No. 2, \$2,860,716; Hanyang iron works, \$19,123,628; Hanyang business office, \$3,057,159; Pinghsiang coal mines, \$10,957,968; Tayeh rock quarries, \$32,019; Wharves and godowns, \$346,418; Haicheng iron mines, \$11,821; Diamond borers, \$12,205; Stocks and shares, \$6,767,683; Loan bonds, \$104,537; Total, \$52,646,791.

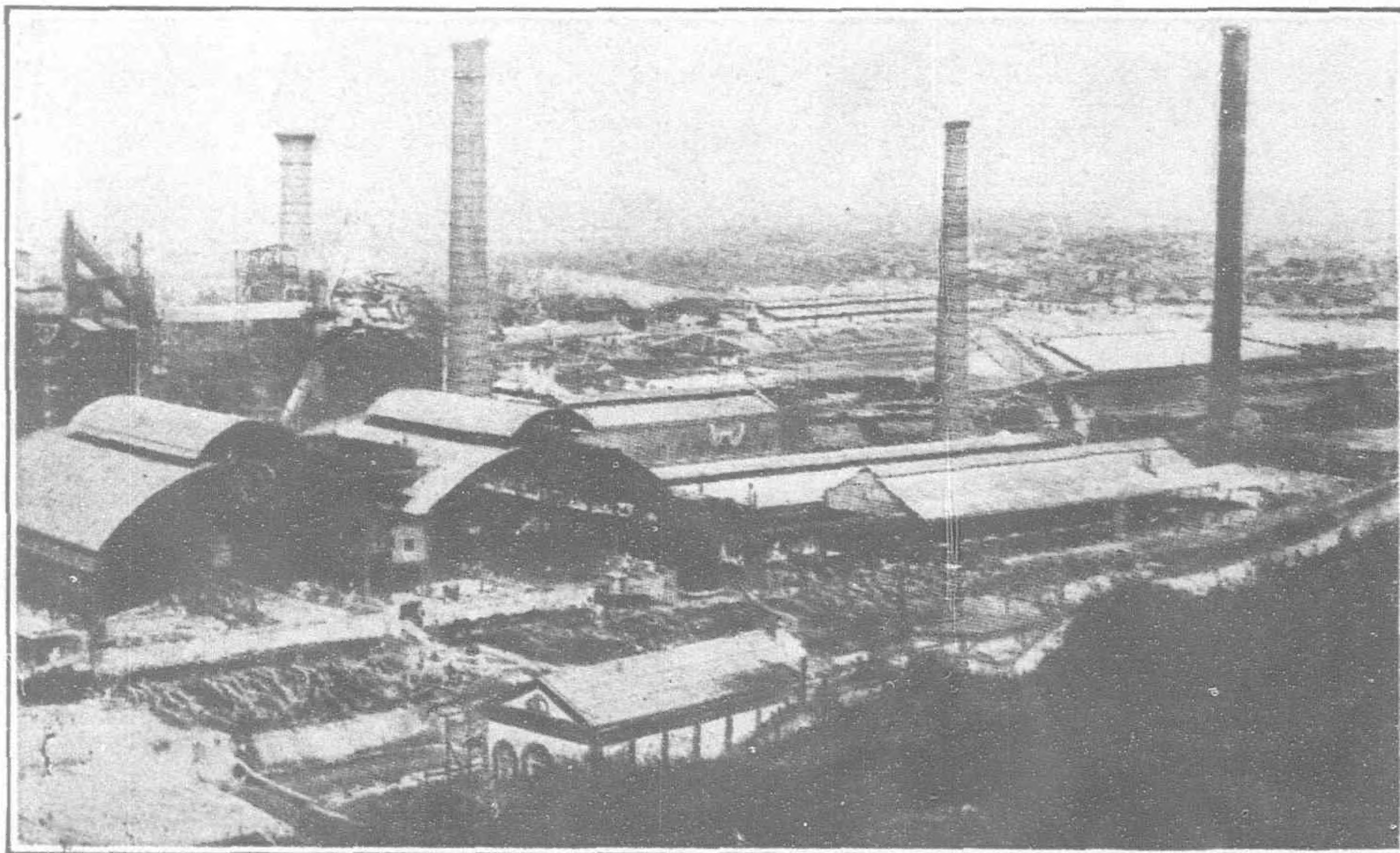
Since its organization in 1891, the Hanyang Iron Works has produced, from 1891 to 1922, 2,171,457 tons of pig iron, 554,856 tons of rails of different gauges and 1,119,196 tons of steel castings. During this period, the Works has installed four blast furnaces, of which two have been dismantled, being out of working order, and seven steel smelting furnaces, all of which are badly in need of repair. The other machinery of the plant is mostly of the old type and out of working order.

The Tayeh iron mines had been worked by primitive methods since the Tang dynasty (618-908). Since 1891, the mines at Laotishan and Shihtzeshan have been worked on a large scale by modernised methods. The ores at the Laotishan mines are almost exhausted, but the Shihtzeshan mines yield a total yearly output of 300,000-400,000 tons, the bulk of which, in pursuance of certain loan agreements, is sold to Japan. The total quantity of ores produced by the Tayeh mines between 1891 and 1926 amounted to 9,467,443 tons.

In 1913, Sheng Hsuan-hwai, the then Director-General of the Hanyehping Company, concluded a Japanese loan of Y. 15,000,000 for the purpose of establishing a new iron works at Yuankiahu Tayeh, but it was not until 1922 that construction work was completed. The new works was equipped with two blast furnaces, one being installed in 1923 and the other in 1926. Each of the furnaces is capable of turning out 400 tons of pig iron daily. The new works operated for only a brief period before they were suspended. The total output of pig iron by the new works between 1923 and 1925 amounted to 252,034 tons.

The Pinghsiang coal mines are located at Anyuan, Pinghsiang-hsien, Kiangsi province. The mines were discovered by a German mining engineer in 1898 and were later on acquired by the Hanyehping Company, which invested Tls. 5,000,000 in the enterprise as working capital. This amount was later increased by a German

loan concluded by Sheng Hsuan-wai and a foreign mining expert was employed to direct the mining operations. The result was quite satisfactory. The coal is of excellent quality and the average monthly output normally amounts to over 2,000 tons. The operations were suspended last year owing to the heavy deficits of the Hanyehping Company, which owes its workmen nearly one million dollars for wages in arrears. Quite recently, the mining operations at Pinghsiang were resumed under the auspices of the Labor Union at Anyuan.



View of a Section of the Steel Works of the Hanyehping Company at Hanyang

Engineering Notes

Canned Goods Company at Wuchow.—The Li Feng Canned Goods Co. has started operations at Wuchow, Kwangsi province. Canned Laipo taros are its specialty. It is the first of its kind in that part of the country.

China Portland Cement Co., Ltd.—A net profit of Tls. 459,871 was realized in 1926 out of a total business of Tls. 130,524,811 by the China Portland Cement Co., Ltd., 62 Kiangse Road, Shanghai. Tls. 14,036,154 was expended for office maintenance and Tls. 420.00 as remuneration to directors. The company is capitalized at Tls. 1,500,000 at Tls. 100 per share divided into 5,000 ordinary shares and 10,000 preference shares.

Japan's Rail Program.—Japan's extensive railway electrification plans are to be started within two years. Electrification of the Ottsu-Akashi line, which will cost nearly \$6,500,000 will be started in 1929 and be completed within three years. The Kozu-Numadzu electrification will also be started in the same year. To supply power in the Kwanto section five electric power stations will be built. Among these will be the large station at Shimanogawa, which originally was estimated to cost \$18,000,000, but revised figures show that more than \$29,000,000 will be required. Electrification of other lines will follow soon afterward.

Japan's Automobile Industry.—Establishment of a domestic automobile manufacturing industry is being actively studied in Japan and may be created with the aid of the Government, under plans now being considered.

Several plans for encouraging domestic production are under investigation, among them increases in the duties on automobiles, accompanied by allowances for the import of machinery for automobile manufacture; the subsidizing of the industry under the military automobile subsidy law; co-operative organization by manufacturers to be aided by Government loans at low interest rates, and the mandatory use by all Imperial Government offices of domestic manufactured cars.

Paper Production of Japan.—Paper production in Japan for 1926 set a record. It amounted to 1,039,758,000 pounds, showing an advance of 107,986,000 pounds over 1925, according to a report of the Japan Paper Mill Association.

Sales totalled 1,007,968,000 pounds, a gain of 109,366,000 pounds over the preceding year. This also broke the previous records. Last year's imported paper amounted to 139,780,816 pounds, valued at yen 20,237,410, showing increases of 39,175,954 pounds and yen 3,376,071 over 1925.

December production was 87,805,000 pounds, and drop of 5,648,000, and December sales 87,180,000 pounds, a fall of 10,725,000 from November. Production of news print was 39,344,000 pounds and sales 37,490,000 pounds for December.

Knitting Industry in Foochow.—The knitting industry in Foochow, China, has practically driven from the local market competition of foreign-made hosiery, towels, undershirts and jackets, according to a report from Consul E. B. Price.

The new industry affords an excellent example of the change in markets caused by the beginning of industrialism for instead of cotton piece goods, hosiery and similar manufactured textiles, foreign countries must begin to look to supply this region with the machines and raw products for their manufacture.

It is estimated that in the last four years about 50 small hosiery and knitting mills have started business in Foochow. At the present time about 20 of these are operating. The capital of the eight largest mills is estimated around \$35,000. They employ more than 300 people and have a total of 153 hosiery and 25 general knitting machines in operation. Their annual production consists of approximately 133,000 dozen pairs of men's socks, valued at \$145,000 and general knitted goods valued at \$40,000.

The Mitsubishi Dockyards, Nagasaki.—Sulzer Diesel Marine Engines have booked an order for another single-screw tanker for the Mitsubishi Trading Co. with a 6ST60 (2250 B.H.P. at 110 r.p.m.).

Mukden-Chinchow Motor Service.—The long distance motor service between Mukden and Chinchow, Fengtien province, which has organised at the end of January, has been running since the end of February. The number of passengers is growing day by day.

Japan Orders Tools from Niles, Bement, Pond.—Pratt and Whitnew Company, subsidiary of Niles, Bement & Pond, has a contract to furnish machine shop equipment and tools for Japanese Government arsenals.

China's Petroleum Imports.—During the first half of 1926, China imported 19,710,000 gallons of fuel oil (compared with 7,981,000 gallons in the first half of 1925), 123,830,000 gallons of kerosene (115,067,000 gallons), 4,049,000 gallons of gasoline (3,239,000 gallons), 4,459,000 gallons of lubricating oils (3,440,000 gallons).

New Engineering and Shipbuilding Works Ltd.—A total net profit of Tls. 190,684.02 including the balance of Tls. 10,723.66 brought forward from the previous year was realized for the financial year ended December 31, 1926, by the New Engineering and Shipbuilding Works, Ltd., 45 Yangtsepoo Road, Shanghai, as compared with Tls. 93,723.66 for 1925. After deducting Tls. 25,000.00 for depreciation and Tls. 3,000.00 as directors' and auditors' fees, a balance of Tls. 162,684.02 was left over. Tls. 35,000.00 was transferred to the balance from the dividend equalization fund, making a total of Tls. 197,684.02 for appropriation. A dividend of 5 per cent. on ordinary shares amounting to Tls. 52,500.00 and another of 8 per cent. on preference shares amounting to Tls. 120,000.00 was declared and paid, leaving a balance of Tls. 25,184.02 to be carried forward to the next account. The total capitalization of the company amounts to Tls. 5,000,000.00 of which an amount of Tls. 2,550,000.00 has been fully paid up, represented by 210,000 ordinary and 300,000 preference shares of Tls. 5 each. H. Arnhold is the chairman of the Board of Directors and C. A. Skinner and A. L. Blechynden are the managing directors.

Japan's Petroleum Market.—The demand for petroleum has greatly increased in Japan during the past few years and at the same time domestic production has decreased. In 1925 the production increased slightly, but advance figures for 1926 indicate a further decline. The 1925 production of 1,628,000 koku was an increase of 49,000 koku, or 3 per cent, over the previous year (1 koku of petroleum equals 4,765,309 American gallons). Most of this increase was due to new wells bored by the Nippon Sekiyu Kabushiki Kaisha (Japan Oil Company), while the cost of sinking and putting the wells into production was said to be greater than the output warranted.

Production of domestic petroleum during the first half of 1926 was about 752,000 koku, or 40,000 koku less than during the corresponding period of 1925. Moreover, while production during the second half of 1925 showed a considerable increase over that for the first half, the second half of 1926 is expected to be 10,000 koku less than that for the first half of the year, making a total estimated production of about 1,500,000 koku for the whole of 1926, 120,000 130,000 koku, or 8 to 9 per cent, less than in 1925.

The North Saghalien Oil Company, Ltd., was organized in the spring of 1926 and has drilled wells in the Oha oil fields. This production is not considered in the open market as the entire output is supplied to the Navy Department and in fact it is a question as to whether it would pay to bring the oil from this distant field to the refineries for general commercial use.

Wireless Stations in Canton and Foochow.—The wireless station in the north suburbs of Canton has been completely installed. After successful tests, the station commenced transmission of messages on December 19. The wireless station in Foochow, capital of Fukien province, has also been repaired and put in communication with the station in Hongkong and along the coast in South China.

Extension of Trolley Lines.—The Shanghai Electric Construction Co., Ltd., 7-8 Soochow Road, Shanghai, has completed an extension of trolley lines from the end of Ward Road to the corner of Tongshan Road and Kwengming Road, passing through Lay Road Bridge Paoting Road, Dalny Road, Thorburn Road, and Whashing Road. The railless tram service was scheduled to begin at the end of March.

Shiuchow-Pingshek Road Kwangtung.—A recent report of the Highway Bureau, Kwangtung province, states that construction of the section from Shiuchow to Lokchong of the Shiuchow-Pingshek Road is nearing completion and traffic on this section is expected to be opened in the middle of June. The other section from Lokchong to Pingshek is being built and will be completed in August. The cost of construction of the whole road is about \$660,000.

Foochow Motor Bus Service Company.—The Foochow Motor Service Company was started in 1918 with a capital of \$150,000. The company has six motor buses, each capable of accommodating 40 passengers, eight ordinary touring cars for private hire and six motor lorries. At first regular passenger services were started on two routes: (1) between the South Gate and Taikiangsin, a town near Foochow and (2) from the South Gate to Makow. Since its inauguration, the company has had a chequered career. The service on the second route was later on suspended owing to poor business. In 1922, the company's cars were commandeered by the army, and the service was completely suspended for a while. It is reported that during the past six years, the company has suffered a total loss of \$50,000-\$60,000. The fare charged by the company is: from the South Gate to Taikiangsin, about 10 *li* apart, 10 cents, and to Nankungyuan for a distance of about 7 *li*, 15 coppers, or nearly 7 cents. From Nankungyuan to Taikiangsin, about 3 *li*, is 15 coppers. Cars for private hire cost \$1.20 for a single trip from the South Gate to Taikiangsin or *vice versa* and \$1.30 to Tientang 12 *li* away. If hired by the hour, the charge is \$4 per hour. Up till quite recently, the company's average daily gross receipts amounted to about \$150, which is barely enough to cover running expenses. Quite recently, the company's cars were again commandeered by the troops.

Insurance Risks in China.—The insurance situation in China is described as especially bad during the civil strife, but bad as well under normal conditions because of the peculiar temperament of the Chinese merchant, said J. C. Huston, United States Consul to Hankow, China, at a recent gathering of foreign trade executives.

"The principal fault lies in the Chinese courts, where it is impossible to get justice in any insurance case, especially where a foreign insurance company is involved," Mr. Huston said. "The companies have learned to avoid as far as possible the merchant risks as they have found that as soon as the merchant sees the market going against him, or business takes a slump, his first thought is to make the insurance company pay."

"Arson is probably more widely practiced than any other sin against insurance, so that fire insurance coverage is particularly bad for the companies. There seems to be no fear of being caught burning stock to collect insurance. All the neighbors seem to know in advance that if the merchant's stocks are not moving at a profit, or that some financial depression has struck him, he will have a fire as a natural resort for indemnification."

"In some instances, even the local fire department has warning of the impending fire, and makes the necessary preparations as to hose and apparatus in advance in order to protect the neighbors against the disaster. So that, if the local fire department shows signs of making ready its equipment, then the insurance firms know that there is to be a fire and take the proper steps. Even with all this warning and evidence, arson-convictions cannot be made."

Shimonoseki Tunnel.—The Moji-Shimonoseki Straits railway tunnel, construction of which was delayed by the earthquake in Japan, is to be constructed in 1928 by the Japanese government. The tunnel will do away with the ferry service connecting Kyushu and points in Honshu, which often is interrupted for twenty-four hours at a time by storms. The bore will cost \$10,000,000 and 3,000 men will be engaged in the work.

Mukden-Hailung Railway.—The Mukden-Hailung Railway running from outside the North Gate of Mukden city, capital of Fengtien province, through Fushun, Tsingyuan and Shanchengtze to Hailung in Fengtien province, has been opened as far as Tsingyuan. The whole line is over five hundred *li* in length, traverses mountainous regions and involves the construction of two tunnels, 142 bridges and over 130 culverts. The major portion of this most difficult engineering work has now been accomplished, and the whole line is expected to be completed this summer.

Japan's Electric Bond Company.—Commenting on the organization of the new Japanese Electric Bond and Share Company whose initial capital was Yen 10,000,000. "Commerce of Calcutta says that 'it is the outgrowth of the close association during recent years of American and English interests in connection with the financing of Japanese power companies in the New Work and London markets.'"

"Not merely in India are schemes of hydro-electrification being rapidly developed. For the last five years the world has watched with interest similar schemes reach fruition in Japan."

"The older companies have now passed the first stages of development and are gradually extending their lines to new centers of distribution, with consequent annual increases of generating capacity. In most cases their shares are selling above par and they have floated loans in America as well as in the Japanese money market."

"Two of the newer organizations are the Nippon Hydro-Electric Company and the Tokio Hydro-Electric Company which are most actively engaged in development work. Their early accomplishments are already bearing fruit and their shares are selling above the issued prices."

"The Nippon Company was originally planned about 1910. In 1919 the company was established with a capital of 50,000,000 yen for the development of three concessions or objects. The first project was originally called the Kansai Denryoku and was organized to develop about 60,000 kilowatts at Seto and other points along the Hida River."

"The second project was the Toyo Aluminum Company, established in 1919 to sell and manufacture aluminum, for which licenses for about 200,000 kilowatts of power were obtained along kilowatts from the Joganji River."

"The third was the Etchu Electric Power Company, which added 10,000 kilowatt from the Joganji River."

"By bringing all these companies under one head and building a 200-mile 154,000-volt transmission line to Osaka with an enormous substation and 100,000 kilowatt steam plant at that great distributing center the company was in an immediate position to show a profit. The difficulty of installing all these stations was great and the program of development is still much hampered by delays in transporting equipment, for the nearest rail head is about fifty miles away. A great deal of the material is carried on a twenty-one mile ropeway."

"A 260-foot dam, one of the highest in the world, is being constructed. It is 1,000 feet wide, will require more than 400,000 barrels of cement and will impound 1,300,000,000 cubic feet of water. The enormous capacity of the dam will make this plant a standby for the rest of the Nippon system."

"At this plant will eventually be installed four 20,000 kva. double frequency generators with suitable step-up transformers and switchgear."

"Nippon Denryoku worked until recently on 50,000,000 yen capital, but a new stock issue of 50,000,000 yen, one quarter paid up, has recently been floated. This gives the company 100,000,000 yen in stock with 62,500,000 yen paid up."

"The demand for the new stock was so great that it commanded a bonus as soon as it was issued. The success of this great company seems assured."

Japan Orders Big Wireless Station.—What is believed the largest wireless station of its kind in the world was ordered recently by the Japanese Wireless Telegraph Company, according to a report to the Department of Commerce. The new station will permit direct communication between Japan and Western Europe. An effort will be made to complete it by the middle of 1928.

China & South Sea Bank Ltd.—A total net profit of \$1,127,419.65 for 1926 was realized by the China & South Sea Bank, Limited, 4 Hankow Road, Shanghai. Out of the net profit, a total of \$300,000 was paid as official interest on its shares at 4 per cent. per share. A total of \$450,000 was appropriated for dividends amounting to 6 per cent. per share. The company is capitalized at \$20,000,000. Its head office is located in Shanghai. Hu Yun is the general manager and Ma Chin sub-manager.

Japan's Textile Program.—A program for the development of domestic yarn and textile manufacturing industries in Japan has been worked out by National Government committees in Tokio, Osaka and Nagoya. The plan is the result of many months' study by these committees which were specially appointed and the preparatory steps have already been taken.

The program has these features: Improvements of the mulberry and cocoons to be effected; better methods of transportation in cocoons; increase of the industry's efficiency; establishment of a sales organization for raw silk; arrangements for money accommodations; reorganization of the silk industry.

The reorganization is laid out on these lines: Association methods; large mill organizations favored; a joint sales safe-keeping and accounting body; allowance by the Bank of Japan of discounts for this association against warehouse receipts; policy of producing only superior silk worm eggs, of regulating cocoon production and preventing careless manufacturing.

Showa Electric Plans Approved.—The Ministry of Communications has sanctioned the transfer of water power concessions and electric power stations held by the Daido Electric Power Company and the Kuhara Mining Company to the Showa Electric Power Company, organized by these two concerns. The Daido interests have the water power concessions along the Rivers Kuzuryu and the power stations and transmission lines, valued at Y.27,500,000 in all. The Kuhara concern has a concession along the Shogawa and power stations valued at Y.12,500,000.

The generating power of the Showa firm on the completion of its power stations and transmission lines is estimated at Y.40,000,000. Power is to be supplied principally to the Hokuriku district for industrial development. The proposed aluminum plant to be erected in Toyama prefecture is expected to buy power from the company. Stations and generating power along the Shogawa and the Kuzuryu are as follows:

Along the Shogawa						K.W.
Stations—						
Shogawa No. 2	...	...	...	...	...	45,000
Shogawa No. 1	...	...	...	...	...	9,400
Tamuki	...	...	...	...	...	17,219
Sakaigawa	...	...	...	...	...	2,160
Kousugawa	...	...	...	...	...	26,600
Iijima	...	...	...	...	...	33,400
Kidani	...	...	...	...	...	9,400

Along the Kuzuryu						
Hanabusa	...	...	...	...	...	9,300
Shimouchinami	...	...	...	...	...	2,300
Higashikatsuhara	...	...	...	...	...	1,300
Managawa No. 1	...	...	...	...	...	1,981
Managawa No. 2	...	...	...	...	...	7,086
Total	...	...	...	...	...	165,152

Transmission Lines				Volts
1. Sasatsu-Funatsu-Atotsu, 20 miles.	...	...	...	77,000
2. Sasatsu-Osaka, 200 miles	...	...	...	154,000
3. Shogawa-Nagoya-Gifu 100 miles	...	...	...	154,000

Air Service for Shanghai.—A new passenger air service between Osaka and Shanghai, to begin this spring, is being planned by the Nippon Kokusaisha (Japan Aeronautic Company) of Osaka. A huge monoplane from Germany has been purchased for the purpose.

The plane will be able to carry ten passengers, besides two pilots, one radio operator and one mechanic.

Artificial Silk, Japan.—Increasing demand for artificial silk in Japan is expected to bring about a decided expansion of the industry in the empire this year. The country's present output is around 5,000,000 pounds annually, but yearly consumption is estimated at 11,450,000 pounds. This necessitates heavy importation. Three new large mills are to be constructed soon.

Mukden-Hailung Railway.—The Mukden-Hailung Railway was built up to Pehshanchengchen in April. Regular traffic opened to that point from May 1. The whole line is expected to be completed in two more months. The Hailung-Chaoyangchen section, 35 li in length, has been built up to the vicinity of Shahotze. The whole line will be completed in September this year.

Automatic Telephones, Canton.—Canton, China, is to have an automatic telephone system, installed by an American company, as soon as the war will permit. A contract has been signed for equipment to accommodate 7,000 subscribers, it is said, and it is expected that 3,000 will begin use of the lines as soon as they are installed. The cost of installation, it is reported, will be \$700,000, but work is not expected to start until more normal conditions prevail in South China.

Transportation Bureau.—By agreement between the Fengtien and Shansi military authorities, freight traffic on the Peking-Suiyuan Railway east of Tatungfu is controlled by the former and that west of Tatungfu by the latter. The Shansi authorities have now established the Paotowchen-Tatungfu Li Shang Transportation Bureau at Tatungfu to take charge of goods traffic on the section under their control. Merchants requiring cars for transportation of goods should apply to the bureau instead of to the railway office.

Radio Broadcasting in Peking and Tientsin.—Offices in charge of radio broadcasting have been established in Peking and Tientsin. Anyone who desires to instal a receiving set in his residence is required to register with one of these offices. According to the regulations governing the installation of receiving sets, all equipment must be purchased from licensed shops. The user must pay an annual fee of \$6-\$12. Importers and sellers of radio equipment must register with the Office of the Superintendent of the Northeastern Long-distance Wireless Telephone Service from which licenses and passports may be obtained. Broadcasting of music, market quotations, news, etc. by radio in Peking and Tientsin is planned.

Carpet Wool From China.—The China wool business, which is of vital interest to the United States because of the vast amount of carpet wool that comes annually from this country, has been seriously disrupted by the war in China. Importations are cut off to a large extent, which places the American carpet industry under a severe handicap.

China is the principal source of carpet wool, supplying American manufacturers with some 60,000,000 to 65,000,000 pounds of the yearly consumption of between 100,000,000 and 150,000,000 pounds. Tientsin is the principal wool market and the exports through that port last year amounted to 18,640,000 pounds for eleven months, while in the same period of 1925 the shipments amounted to 48,800,000, and in 1924 the amount was 51,871,000 pounds.

Boston houses have decreased their wool orders in China materially since December owing to the uncertainties of deliveries. Receipts at American ports are likely to be relatively small for several months. This is unfortunate, because carpet manufacturing is in a healthy condition, requiring large quantities of wool, and the industry will have to turn to other sources of raw material.